THE REVIEW

OF

APPLIED MYCOLOGY

Vol. XX

ISSUED BY THE IMPERIAL
MYCOLOGICAL INSTITUTE

THE IMPERIAL MYCOLOGICAL INSTITUTE
KEW, SURREY

1941

IMPERIAL MYCOLOGICAL INSTITUTE

EXECUTIVE COUNCIL

STAFF

PRINTED IN GREAT BRITAIN AT THE UNIVERSITY PRESS, OXFORD
BY JOHN JOHNSON, PRINTER TO THE UNIVERSITY

ERRATA

page 24 line 30 for 'Bauer' read 'Baur'
54 lines 2 and 8 for '*P. graminis secalis*' read '*P. rubigo-vera secalis*'
line 11 for '*P. triticina*' read '*P. rubigo-vera* [*triticina* = *P. triticina*]
82 28 for '*longuis*' read '*longius*'
84 lines 20 and 22 for 'to' read 'by'
85 line 11 after 'Holmes)' insert 'strains'
85 12 for 'name and name' read 'names and names'
114 13 for '*popiliae*' read '*popilliae*'
14 for '*Popilia*' read '*Popillia*'
272 45 'Lichtenfelde' read 'Lichterfelde'
284 27 for 'identical with' read 'due to frost injury of trees affected by'
for 'due to some similar' read 'or some'
291 lines 18 and 19 for '36 and 12' read '12 and 36'
322 line 5 for 'xx' read 'xix'
328 23 for '*Pine*' read '*Pinus*'
390 26 for 'Gries' read 'Greis'
433 31 for 'and' read 'which'
449 41 for '*spinacea*' read '*spinaciae*'
466 13 for 'Great Britain' read 'British Isles'
491 17 for 'Chariton (E. G.)' read 'Chariton (J. G.)'
509 4 for 'Bremer (A.)' read 'Bremer (H.)'
516 45 for '*cucumis*' read '*cucumeris*'
518 23 for '*levis*' read '*avenae*'
547 20 for '*ciborius*' read '*cibarius*'
596 43 for '*menthae*' read '*mentha*'
597 19 for '*kamerunsis*' read '*kamerunensis*'

IMPERIAL MYCOLOGICAL INSTITUTE

REVIEW
OF
APPLIED MYCOLOGY

VOL. XX JANUARY 1941

JUNELL (S.). **Granens rostsvampar.** [Spruce rusts.]—*Skogen*, xxvii, 10, pp. 179–181, 4 figs., 1940.

Outlines are given of the life-histories of the rusts attacking spruce in Sweden, viz., *Chrysomyxa woronini*, *C. ledi* [*R.A.M.*, xvi, p. 191] (the alternate host of both of which is *Ledum*), the monoecious *C. abietis* [ibid., xviii, p. 348], *C. pyrolae* [ibid., xviii, p. 643] (*Pyrola*), and *Pucciniastrum padi* [ibid., vi, p. 701] (bird cherry [*Prunus padus*]).

EADES (H. W.). **Sap-stain, mould, and decay in relation to export shipments of British Columbia softwoods.**—*Circ. For. Serv.* 57, 12 pp., 1940. [Mimeographed.]

Particulars are given of an inquiry conducted by the Forest Products Laboratories, Dominion (of Canada) Forest Service, into the various factors involved in the production of sap stain, mould, and decay in British Columbia softwood timber [*R.A.M.*, xi, p. 614] destined for export to overseas markets, where complaints have been made of its arrival in a 'de-graded' and blemished condition, while in certain cases actual decay is alleged to have been present.

The investigations were carried out on a number of test shipments to Australian and English ports and on one to Montreal. Western white pine [*Pinus monticola*] was found to be the most susceptible of the export woods to sap stain and mould, followed by Sitka spruce [*Picea sitchensis*], western hemlock [*Tsuga heterophylla*], and Douglas fir [*Pseudotsuga taxifolia*], western red cedar [*Thuja plicata*] being highly resistant to this type of injury. *Picea sitchensis* and, to a lesser extent, *Pseudotsuga taxifolia* are also subject to infection by a mould producing 'pink dote', i.e., superficial terra cotta or brick-red spots both on the heart- and sapwood [cf. ibid., xix, p. 629]. Temperature conditions in British Columbia, except during the extreme cold of winter, are generally favourable to initial infection by sap stain and moulds, the further development of which in transit is promoted by the heat and lack of ventilation prevailing in ships' holds during voyages through subtropical and tropical waters.

The robust, leathery, white or yellow mycelial mats sometimes formed by *Fomes pinicola* on timber, especially of *Tsuga heterophylla* and *P. taxifolia*, in storage or transit are readily distinguishable from the green or mottled green discoloration due to the moulds. According to Cartwright, three-quarters of the incidence of definite rot, involving

internal disintegration of the wood, in Douglas fir imported into England is attributable to *Trametes serialis* [ibid., xviii, p. 361]. All forms of decay are liable to spread in coniferous timber left in large piles in the open for protracted periods.

The best means of prevention of the defects under discussion is the reduction of the moisture content of the wood to 20 to 25 per cent. by air-seasoning or kiln-drying before shipment, during which and after arrival at its destination the timber must of course also be maintained in a dry state. Two groups of chemicals, viz., organic mercury compounds and various chlorinated phenols, afford valuable protection against sap stain, but are less effective in mould control and entirely useless in the control of any kind of infection already established in the wood.

Long (W. H.) & Goodding (L. N.). **Notes on Gymnosporangium cupressi.**—*Mycologia*, xxxii, 4, pp. 489–492, 1 fig., 1940.

In this paper the authors describe the pycnidial and aecidial stages of a fungus on *Amelanchier mormonica* (?), which circumstantial evidence indicates as belonging to the life-cycle of *Gymnosporangium cupressi*. An emended description of the teleutospore stage found on *Cupressus arizonica* and its var. *bonita* is given.

Ray (W. W.). **Notes on Gymnosporangium in Oklahoma.**—*Mycologia*, xxxii, 4, pp. 572–574, 1940.

An annotated list is given of eight species and varieties of *Gymnosporangium* found on *Juniperus* in Oklahoma in the spring of 1939. *J. mexicana* in the Arbuckle Mountains was attacked by *G. exiguum*, nearly every tree of several hundreds examined being infected, though no ill effects were apparent. This is the first report of the fungus in Oklahoma. *J. mexicana* remains immune from *G. juniperi-virginianae* even if many infected *J. virginiana* trees are present in the vicinity. Nurserymen are, therefore, recommending the use of *J. mexicana* in the place of *J. virginiana*.

Wilson (J. D.). **Certain injurious effects of spraying vegetables with the fixed coppers.**—*Bi-m. Bull. Ohio agric. Exp. Sta.*, xxv, 203, pp. 36–43, 1940.

Some of the fixed copper preparations now widely used in Ohio at a strength of 1 part of metallic copper in 50 gals. as substitutes for Bordeaux mixture in the control of vegetable diseases [*R.A.M.*, xix, p. 507] have been found to cause various types of injury. For instance, the yield of carrots treated against *Macrosporium* [*carotae*] and *Cercospora* [*carotae*] was reduced by cuprocide 54-Y from 18 to 16 and from 22·7 to 9·5 tons per acre in two tests on muck and sandy loam soils, respectively, in which no infection developed. Coposil caused considerable foliar damage and reduced the yield in the sandy loam plots to 11·6 tons per acre. On the muck soil Grasselli copper A caused no decline in output and copper hydro 40 only a slight drop, whereas on the loam the yields from the plots treated with these preparations were only 16·5 and 16·3 tons per acre, respectively, compared with 22·7 in the controls, the corresponding figures for Bordeaux mixture, tribasic

copper, and 'copper oxychloride sulphate' being 19·5, 15·8, and 15·0 tons per acre, respectively. In another trial on muck soil in which the leaf spots were severe, the yield was 23·8 tons per acre for the controls and 32·6, 32·3, 31·4, 30·9, 30·7, 29·4, and 27·4 tons per acre for the plots treated with Bordeaux mixture, tribasic copper, basic copper arsenate, Grasselli copper A, cuprocide 54-Y, cupro-K, and brown cupric oxide, respectively.

Tomatoes afford a striking example of the consistent failure of spraying to increase yields unless leaf spot (*Septoria* [*lycopersici*]) occurs in a sufficiently acute form to cause at least 20 per cent. defoliation in the absence of control measures. Bordeaux mixture and (to a lesser extent) some of the fixed coppers have also been observed to delay the ripening of tomatoes and increase the incidence of blossom-end rot.

In 1939 all the fixed coppers reduced the yields of Lima beans [*Phaseolus lunatus*] in which bacterial leaf spot [*Bacterium phaseoli*] did not develop, cuprocide 54-Y, tribasic copper, and brown cupric oxide causing the heaviest losses (the yields being only 75, 74, and 74 lb. per plot as against 86 lb. for the controls) in one series of tests, and copper oxychloride sulphate and cuprocide 54-Y in the other (46 and 36 lb. compared with 80 lb.).

The maturity of muskmelons sprayed against bacterial wilt [*Erwinia tracheiphila*] and miscellaneous leaf spots tends to be retarded by the fixed copper preparations, but the increased yield of ripened fruit may be considered to outweigh the drawbacks.

Nagel (C. M.) & Leonard (O. A.). **The effect of Cercospora beticola on the chemical composition and carbon assimilation of Beta vulgaris.**—*Phytopathology*, xxx, 8, pp. 659–666, 1940.

A comparative study was carried out at the Iowa State College on the chemical composition of three groups of sugar beet plants, (1) infected by *Cercospora beticola* [*R.A.M.*, xix, p. 687], (2) pruned in such a way as to simulate defoliation by the fungus, and (3) healthy. The disease reduced the sucrose percentages in the roots from 15·27 to 12·08, in the crowns from 13·63 to 11·18, in the leaf blades from 1·99 to 1·18, and in the petioles from 9·84 to 3·48. The amount of total nitrogen in the diseased roots (0·161 per cent. of the fresh weight) and crowns (0·237 per cent.) of greenhouse plants exceeded that in the pruned (0·109 and 0·183 per cent.) and healthy (0·096 and 0·185 per cent., respectively), the corresponding figures for field grown plants being 0·229 and 0·314, 0·174 and 0·242, and 0·183 and 0·285. The roots and crowns of infected plants, grown in the greenhouse or field, were higher in soluble nitrogen than the corresponding pruned and healthy tissues. The total nitrogen values were found to decline in the leaf blades and petioles as the disease progressed. The capacity of the foliage for the assimilation of carbon dioxide from the air also diminished as the incidence of the disease advanced, from 6·30 mg. per 100 sq. cm. per hour to 0·49 in extensively necrosed foliage.

Brooks (A. N.). **Control of sclerotiniose of Celery on Florida muck.**—Abs. in *Phytopathology*, xxx, 8, p. 703, 1940.

The results of controlled temperature experiments showed that the

minimum, optimum, and maximum temperatures for mycelial growth in *Sclerotinia sclerotiorum*, the agent of severe damage to celery [*R.A.M.*, xviii, p. 789] on muck soils near Sarasota, Florida, under humid conditions, are below 45°, 75°, and 83° to 89° F., respectively. Below 70° the sclerotia produced apothecia within 28 to 34 days, but none developed above this point. Sclerotia buried deeper than 3 in. in the soil formed only stipes incapable of reaching the surface and giving rise to apothecia. Deep ploughing gave poor control, since not all the sclerotia were buried to the requisite depth, but flooding the muck for six to eight weeks in the summer destroyed 90 per cent. of these organs, while post-harvest or pre-planting applications of calcium cyanamide were equally effective.

NEUWEILER (E.). **Pflanzenschutz.** [Plant protection.]—*ex* **Bericht über die Tätigkeit der Eidg. landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon für die Jahre 1934–1938.** [Report on the work of the Federal Agricultural Experiment Station Zürich-Oerlikon for the years 1934 to 1938.]—*Annu. agric. Suisse*, xlv, 3, pp. 345–355, 1940.

In the first four of the five years under review [cf. *R.A.M.*, xv, p. 1], Abramoff's method of disinfecting wheat seed-grain against bunt [*Tilletia caries* and *T. foetens*] by mixing it with sawdust impregnated in 0·2 per cent. formalin [ibid., xi, p. 35] was tested with very satisfactory results as regards elimination of the pathogens and increased production, but germinability was slightly impaired. Of the other preparations tested for the same purpose, U. 564 (I.G. Farbenindustrie, Leverkusen) again [ibid., xv, p. 1] gave good control, immersion and sprinkling being superior to the short disinfection process, which also proved inadequate in the case of germisan. G4207 II (Sacharinfabrik, Magdeburg S.O.), applied in liquid and dry forms, exerted a strong fungicidal action in 1937–8, but was slightly detrimental to germination. Abavit also combated the disease effectively. Of the dusts used in the trials, sagran (R. Maag, Dielsdorf), F.D. (Flora, Dübendorf), abavit-universal, abavit-neu, and Präparat 413a (L. Meyer, Mainz) [ibid., xv, p. 285] were approved for the end in view. Formalin, uspulun-universal, and ceretan [ceresan], included as controls, maintained their reputation.

Of recent years loose smut of wheat [*Ustilago tritici*] has become more prevalent, especially in the winter variety Mont Calme and the summer Huron. Control may be effected by ten minutes' immersion of the seed-grain in water heated to 52° C., preceded by four hours' soaking at 25° to 30°; the winter wheat responded somewhat better than the summer to this treatment. The addition of a 4 per cent. alcohol solution to the hot water, recommended by Gassner [ibid., xii, p. 500], in no way contributed to the success of the method.

Ceresan-liquid and Schering's liquid steep 3030 and dust 910 gave perfect control of *U. avenae* on oats in one year's tests.

The following average increases of yields over the untreated controls were obtained from 1934 to 1938 in potato spraying experiments with various preparations [against *Phytophthora infestans*: ibid., xv, p. 1]: cusisa 19·7 per cent., kupferkalk Siegfried 16·2, Bordeaux Xex [ibid., xviii, p. 87] 12·5, Ob 21 neu 10·2, kukaka 9·1, cupro Maag 7·4, Sch

1153 7, fungolit 4·3, neotox 4·2, and Ob 21 0·8. An attempt was made to forestall the development of the brown rot phase of late blight in the tubers by cutting off the sprayed haulms 10 to 14 days before lifting, or burning them with sulphuric acid [ibid., xvii, p. 131], but both in 1937 and 1938 these practices led to diminished assimilation and a consequent reduction of yield amounting to 3·5 and 4·2 per cent. for cutting and burning, respectively.

The use of preservatives, including karsan [ibid., xv, p. 224], for the control of storage rots of potato may be expected to give beneficial results only under unfavourable harvesting and keeping conditions. Many of the preparations sold for this purpose contain formaldehyde, the use of which for the preservation of table potatoes is prohibited by the Swiss food laws.

The percentages of black scurf [*Corticium solani*] and scab [*Actinomyces scabies*] counted in the seed potato examinations of 1934, 1936, 1938, and 1923 to 1938 were 10·6, 2·7, 6·7, and 8·6, and 7·8, 8, 8·4, and 5, respectively.

Since the potato wart [*Synchytrium endobioticum*] epidemic of 1931 [ibid., xi, pp. 468, 495] there has been only one severe outbreak of the disease, in Ticino in 1937, which was effectively combated by the cultivation of immune varieties. Bacterial ring rot (*Bacillus* [*Bacterium*] *sepedonicum*) was recorded for each of the years 1934, 1936, 1937, and 1938.

EASTHAM (J. W.). **Report of Provincial Plant Pathologist.**—*Rep. B.C. Dep. Agric., 1938*, pp. L42–L48, 1939; ibid., *1939*, pp. B57–B60, 1940.

The only new disease reported for British Columbia during 1938 [cf. *R.A.M.*, xvii, p. 797] was bean [*Phaseolus vulgaris*] rust (*Uromyces appendiculatus*), which occurred in the plantings of two Japanese growers at Pitt Meadows. It is widely distributed in Eastern Canada in a mild form.

Downy mildew (*Peronospora effusa*), occasionally recorded in the past on spinach and prevalent on *Chenopodium album*, for the first time caused heavy damage on the canning crop in the Vancouver District.

Cherry mosaic [ibid., xvi, p. 192] is practically restricted to the City of Nelson, Kootenays, where upwards of 100 trees are thought to be involved. Pending the development of some easily applicable and reliable objective test, the initiation of a compulsory eradication campaign presents great difficulties, since some of the diseased trees with marked foliar symptoms continue to yield heavy crops of fruit, and their owners are naturally reluctant to have them destroyed. D. G. Milbrath, in a tour of inspection, observed suspicious symptoms on the widely distributed wild *Prunus emarginata*, which is known to be a host of mosaic and may well develop into a reservoir of infection for cultivated cherries. A mild type of mottling found on winter-injured cherry trees in 1937 had disappeared in 1938, confirming the supposition of a connexion between damage from cold and a certain form of chlorosis. An abnormality of cherry trees associated with foliar elongation, deep and irregular indentation, and asymmetry [ibid., xvi, p. 707] was pronounced by D. G. Milbrath to be in all probability identical with

crinkle, a genetic disorder occurring in California, and confirmatory evidence was afforded by the normal development in the Okanagan of grafts from a healthy tree worked on an abnormal one. On the other hand, samples of crinkle gave positive reactions for the presence of a virus, possibly of independent occurrence, in laboratory tests. A trouble resulting in the failure of apparently healthy Lamberts to produce fully ripe fruit was declared by the above-mentioned authority to be definitely distinct from buckskin [ibid., xiv, p. 111].

'Flat limb' is the name proposed for a peculiar malformation, apparently of virus origin, of Gravenstein apple trunks and branches, which yielded neither bacteria nor fungi.

Pear scab [*Venturia pirina*] in coastal situations proved amenable to treatment with bouisol or lime-sulphur in a series of experiments from 1936 to 1938, the average percentages of marketable fruit obtained being 84·6 and 84·9, respectively, compared with 80·1 and 58·9 for Bordeaux mixture and the controls, respectively. Three applications, at the pink and calyx stages and three weeks after the latter, suffice in an average season.

Ridit, a winter wheat resistant to bunt [*Tilletia caries* and *T. foetens*], has been licensed by the Dominion Government after seven years' test. In 1937–8 the percentage of infection in this variety at Armstrong was 0·1 and its yield 40 bush. per acre compared with 41·5 per cent. bunt and 19·1 bush. for Jones Fife; others giving outstanding results included Triplet×White Odessa (0·1 per cent. bunt and 43·9 bush. per acre), White Odessa×Hard Federation (0·0 and 32·6, respectively), Hymar (0·0 and 34), and Hussar (0·4 and 43·9).

Defoliation of English holly in storage was experimentally shown to be controllable by the maintenance of a low temperature (32° to 40° F.) and the omission of waxed paper as a lining for the packing cartons where any possibility exists of a rise to upwards of 50°.

The following new diseases were recorded in 1939: dark berry of *Cotoneaster horizontalis* (*Phytophthora cactorum*), responsible for a pale grey to black discoloration impairing the ornamental value of the shrub; *Cytospora* [*Valsa*] *ambiens* [ibid., xiii, p. 244], isolated from the bark of *Cotoneaster simonsii* twigs and branches apparently killed by the fungus; filbert [*Corylus avellana*] canker (*Phomopsis revellens* von Höhn.), in which the share of the fungus was difficult to determine owing to previous damage by neglect and fire; leaf spot of *Rhododendron* (*Diplodina eurhododendri*); and halo blight of beans (*Phytomonas* [*Bacterium*] *medicaginis* var. *phaseolicola*), nearly all the infected crops of which were raised from seed purchased from registered seed growers in Ontario.

Stony pit of Bosc pears, formerly believed to be a form of drought spot, failed to yield to soil improvement treatments with boron in 1938 and is now attributed to the virus causing a similar disease in the United States [ibid., xviii, p. 463].

Five of the ten spring wheat varieties tested for their reaction to black chaff (*Bact. translucens* var. *undulosum*) [cf. ibid., xviii, p. 665] remained free from infection, viz., Red Bobs, Marquis, Thatcher, Canus, and C–26–44·7, Garnet and Reward were slightly attacked, Regent moderately, and Apex and Renown severely.

In trials on the reaction of various leguminous fodders to wilt (*Sclerotinia trifoliorum*), subterranean clover [*Trifolium subterraneum*] Ott. 1559 and crown vetch [*Coronilla varia*] were immune, while early red clover [*T. pratense*], sainfoin, and bird's foot and yellow trefoils [*Lotus corniculatus* and *T. procumbens*] developed 40, 60, 15, and 35 per cent. infection, respectively.

THOMPSON (A.). **Notes on plant diseases in 1939.** *Malay. agric. J.*, xxviii, 9, pp. 400–407, 4 pl., 1940.

In these notes on plant diseases in Malaya in 1939 [cf. *R.A.M.*, xviii, p. 503] the author states that fructifications of *Fomes noxius* and *Ganoderma lucidum* have been observed to develop only on felled oil palms affected with stem rot prior to felling. The fungi most commonly found on felled stems are *Poria ravenalae* [ibid., xvi, p. 656], *Polystictus sanguineus*, and *G. applanatum* var. *tornatum* [ibid., xi, p. 105; xii, p. 116; xv, p. 16]. Evidence was obtained that it is safe to bury stems infected with *F. noxius* provided the oil palm area is not to be replanted with rubber, tea, or other dicotyledonous crops. In some localities, bronzing and yellowing of the older leaves, frequently accompanied by orange spotting of the pinnae of the tips of the younger leaves, was prevalent. Crown disease was common in replanted and newly opened-up areas.

No differences in hydrogen-ion concentration of the stem juices (P_H 5·4) and leaf juices (4·2) were observed between healthy and wilted Singapore Canning pineapples. The leaf juices of this variety were considerably more acid than those of Smooth Cayenne in Hawaii.

Die-back of tea on the higher land of an estate in Selangor appeared to have been induced by drought. An increase in the number of seed-bearers killed by *Poria hypolateritia* was observed at the Tanah Rata station, Cameron Highlands, where, however, *Ustulina zonata* [ibid., xviii, p. 504] remains the usual cause of the death of tea bushes and seed-bearers. Highland tea was attacked by *Sphaerostilbe repens* [ibid., xix, p. 369].

Marasmius semiustus [*M. stenophyllus*] was recorded for the first time as responsible for the death of dry land (hill) rice, a considerable number of the plants being killed. The fungus set up a decay of the outer leaf sheaths which spread inwards at the base. A species of *Aframomum* growing as a weed in the vicinity was also killed. Infection was favoured by poor soil conditions. Glume spot of rice was caused by *Pyrenochaeta oryzae* [ibid., xiii, p. 652].

Rotting of the young green fruits of *Nephelium lappaceum* and splitting of maturing fruits due to *Oidium* sp. [ibid., xviii, p. 504] were again observed at Johore on the trees affected in 1938, the condition also occurring for the first time in Selangor. An undescribed *Phomopsis* was associated with a wilt of seedlings and a die-back of the scions of *N. lappaceum* buddings. Isolations from tissues of branches of the same host affected by blistering and hypertrophy yielded *Nectria haematococca* [ibid., xviii, p. 795] and other organisms, inoculations with all of which gave negative results.

During wet weather, severe fruit rot of papaw was caused by *Phytophthora palmivora* (rubber strain), which also attacked the trees at soil-

level, with resultant root and collar rot [ibid., xviii, p. 655]. *P. parasitica* caused foot rot of the same host in Johore.

The fungus resembling *U. zonata* reported as associated with *F. noxius* in a root and collar decay of avocado pear [ibid., xviii, p. 504] was identified by E. W. Mason as *Nummularia anthracodes* (Mont.) Cooke var. *gliricidiae* Rehm. Cultures from the fructifications yielded a species of *Xylocladium*, possibly parasitic on the *Nummularia*, or representing its conidial stage.

Colocasia esculenta plants in Perak and Selangor were affected by leaf blight due to *P. colocasiae* [ibid., xviii, p. 505], the fungus occasionally causing corm decay. The disease is not likely to be of importance except in wet weather. The same organism also caused wilt of *Piper betle* in Perak and Pahang.

Cinchona ledgeriana was affected by a die-back favoured by failure of the roots to penetrate a stiff subsoil; *P. cinnamomi*, not previously recorded on *Cinchona*, was isolated from the decaying root tissues and identified by S. F. Ashby. Inoculations showed the fungus to be a weak parasite. It was also isolated from wilted seedlings of *C. succirubra*, *C. ledgeriana*, and hybrid seedlings of these species. The plants showed bark rot and canker at the collar, and the stems were split to a height of 3 to 9 in.

The only fungus likely to cause disease that has been found in compost, increasingly used as a manure locally, is *Sclerotium rolfsii*. Plants affected by any disease should not be used for composting.

Plant diseases. Notes contributed by the Biological Branch.—*Agric. Gaz. N.S.W.*, li, 9, pp. 517–521, 3 figs., 1940.

With either of the two alternative Bordeaux mixture spraying programmes recommended for the control of citrus black spot [*Phoma citricarpa*: *R.A.M.*, xix, pp. 69, 143] in New South Wales, the first application should be effected when most of the blossoms on the northern side of the trees have shed their petals, but before all the petals have fallen from the opposite side. The addition of ½ gal. red spraying oil per 80 gals. spray is recommended for spreading purposes. The increased control of black spot brought about by using either programme in conjunction with two applications of white oil [loc. cit.] has amounted in some instances to as much as 16 per cent. The first oil application is made about mid-December, and the second about mid-February, the concentration in each case being 1 in 40.

Strawberry leaf scorch (*Diplocarpon earliana*) [ibid., xix, p. 692] is stated to be very prevalent locally, and recommendations for its control are suggested.

Pontis (R. E.). **Observaciones fitopatológicas.** [Phytopathological observations.]—*Bol. agríc., Mendoza*, viii, 5–6, pp. 162–168, 4 figs., 1 diag., 1940.

An account is given of the writer's recent observations on spotted wilt of tomatoes, which is stated to constitute an economic problem in the province of Mendoza, Argentine Republic, where severe damage was also caused during the period of the investigations [presumably 1939 to 1940] by downy mildew of the vine (*Peronospora*) [*Plasmopara*

viticola], celery blights (*Septoria apii* and *S. apii-graveolentis*), and shot hole of stone fruits (*Coryneum* [*Clasterosporium*] *carpophilum*) [*R.A.M.*, xix, p. 544], especially Grand Monarch peaches.

TAKIMOTO (S.). **Bacterial plant diseases in Japan. (8). Additional new host plants for Bacterium solanacearum.**—*Bull. sci. Fak. terk. Kjusu Univ.*, ix, 1, pp. 1–6, 3 figs., 1940. [Japanese, with English summary.]

From the discoloured vascular bundles of dahlias and beans [*Phaseolus vulgaris*] suffering from wilt disease during hot summer weather *Bacterium solanacearum* was isolated and inoculated with positive results into these hosts, tobacco, and tomato. The strains of the organism from the two latter plants were likewise pathogenic to dahlias and beans. No physiological differences were found to exist between the bacteria from the various sources under observation. The dahlia wilt is believed to be identical with that previously attributed by S. Hori to *Bacillus dahliae*.

MATSUMOTO (T.). **Phage-produced resistant strains of Bacillus aroideae. II. The behaviour of the organisms in phage-inoculated sand cultures.**—*Trans. nat. Hist. Soc. Formosa*, xxx, 200 201, pp. 89 - 98, 1940.

The bacteriophage specific for *Bacillus* [*Erwinia*] *aroideae* [from radishes: *R.A.M.*, xix, p. 266] was found to accumulate more abundantly and maintain its activity longer in sand cultures than in phaged potato dextrose solutions. Most of the organisms isolated from the phaged sand cultures were found to be still susceptible to the bacteriophage, whereas those from liquid media were rapidly converted into resistant forms. As in the case of the liquid cultures, the multiplication of the bacteria in the sandy substrata was considerably reduced by the admixture of the bacteriophage.

DILLON WESTON (W. A. R.). **Seed treatment.** *J. Minist. Agric.*, xlvii, 2, pp. 103–106, 1940.

Brief, practical notes are given on cereal seed disinfection by means of copper sulphate, formalin, and organic mercury dusts [*R.A.M.*, xix, p. 521].

ARZUAGA (J. G.). **Perspectivas de producción de nuevas variedades de Trigo en el Instituto Fitotécnico de Santa Catalina.** [Prospects for the production of new Wheat varieties in the Phytotechnical Institute of Santa Catalina.]—*An. Inst. fitotéc. Santa Catalina*, i, pp. 9–15, 1939. [Issued 1940. Abs. in *Plant Breed. Abstr.*, x, 4, p. 279, 1940.]

Two of the hybrids derived from a cross between Chinese 166 (resistant to *Puccinia glumarum*) [*R.A.M.*, xiii, p. 620] and Lin Calel have given promising results in tests at Santa Catalina [Argentina], combining immunity from the rust with superiority to the standard La Previsión 25 in yield and to 38 M.A. in baking quality. A cross between Ardito and Lin Calel also yielded a hybrid uniting fair resistance to *P. glumarum* and *P. triticina* with satisfactory production and baking quality.

Informe anual correspondiente al año agricolo 1939–40. [Annual report for the agricultural year 1939–40.]—*Bol. Chacra Exp.* '*La Previsión*' 3, pp. 3–33, 1940. [Abs. in *Plant Breed. Abstr.*, x, 4, p. 273, 1940.]

Resistance to bunt (*Tilletia* sp.) is stated to have been maintained by a selection of the Kanhard wheat variety made at the Chacra Experiment Station, Brazil, a list being given of other highly or moderately resistant varieties. Resistance to *Ustilago hordei* has been shown by the forage barley R.M. 85 and the malting selection 112/30 Bve.

CHESTER (K. S.). **A machine for controlling loose smut in Wheat and Barley.**—*Circ. Okla. agric. Exp. Sta.* 86, 8 pp., 2 figs., 1 diag., 1940.

To meet the need for a convenient, economical, and effective co-operative seed-grain treatment for the control of loose smuts of wheat [*Ustilago tritici*] and barley [*U. nuda*], a portable machine has been constructed at the Oklahoma Agricultural Experiment Station for the application of the hot water method of disinfection. Usually only sufficient seed-grain is treated to plant a separate plot, the wheat harvested from which is used the following season to plant the main acreage. A full-sized machine of the type described in the present paper has a treating capacity of 500 bush. per day, corresponding to a smut-free acreage the following year of 500 to 1,000 acres. The model in actual use has been built to $\frac{2}{5}$ scale, the maximum cost of construction being estimated at $200.

The apparatus consists of grain baskets attached to 4 in. rubber conveyor belts arranged to rotate at a speed requiring exactly 10 minutes for the baskets to move from one end of the hot water tank to the other. A double-walled partition, packed with mineral wool, separates the larger tank, in which the temperature (for wheat) is maintained at exactly 129° F., from the smaller pre-heating tank, containing water heated to about 120° by means of free steam bubbling through $\frac{1}{16}$ in. jets in three valve-controlled pipes. The seed baskets are constructed of galvanized screen wire, reinforced by rigid wire rods. Each bath contains a floating thermometer for temperature regulation. Barley requires 13 minutes' immersion at 126°, necessitating the substitution of a slightly larger gear wheel on the drive shaft. Although the heat treatment is a preventive of wheat bunt [*Tilletia caries* and *T. foetens*] as well as of *U. tritici*, the subsequent dusting of the seed-grain with an organic mercury dust, such as new improved ceresan, is recommended to guard against soil-borne infection.

GARRETT (S. D.). **Temporary leys and the take-all and whiteheads disease of Wheat and Barley.**—*J. Minist. Agric.*, xlvii, 2, pp. 134–135, 1940.

As a result of tests carried out at Rothamsted with 17 common pasture grasses, *Phleum pratense* and *Arrhenatherum avenaceum* are confidently recommended as highly resistant to *Ophiobolus graminis* [*R.A.M.*, xix, p. 525]; a temporary ley of either in combination with clover will, therefore, no longer act as a carrier of infection from barley to the next wheat crop.

Russell (R. C.) & Sallans (B. J.). **The effect of phosphatic fertilizers on common root rot.**—*Sci. Agric.*, xxi, 1, pp. 44–51, 1940.

In field plot experiments conducted in several localities in Canada during 1937, 1938, and 1939, wheat receiving applications of phosphatic fertilizers generally exhibited a somewhat higher rate of infection by common root rot (*Helminthosporium sativum* and *Fusarium* spp.) [*R.A.M.*, xix, p. 650] than did unfertilized wheat. For instance, applications of triple superphosphate (33 lb. per acre) and ammonium phosphate (30 lb.) to plots in four localities in 1937 increased the disease ratings from 11·1, 16·5, 28·8, and 23·1 in the controls to 12·8, 18·0, 30·7, and 25·4, and 12·2, 16·4, 29·8, and 24·9, respectively. In 1939 disease ratings for untreated plots and plots treated with triple superphosphate, ammonium phosphate, and ammoniated superphosphate (33 lb.) in four localities were 11·5, 5·8, 25·2, and 26·7; 17·5, 9·3, 27·0, and 27·9; 18·9, 11·5, 28·8, and 26·4; and 15·8, 9·5, 27·4, and 27·5, respectively. Nevertheless, the fertilized wheat frequently yielded more grain than did the unfertilized. It is concluded that the increase in yield, due to the phosphates, more than balances the losses due to the increase in disease. Under other conditions, however, it might be possible for the influence of the disease to outweigh the effect of the phosphatic fertilizers.

Carroll (P. T.). **The effect of certain powder disinfectants on the control of leaf spot in Oats.** Reprinted from *J. Dep. Agric. Eire*, xxxvii, 1, 16 pp., 1940.

In small-scale quantitative experiments carried out in Éire in 1932, the average yield of dressed grain per healthy oat plant and per plant showing primary infection by *Helminthosporium avenae* [*R.A.M.*, xvii, p. 809] was, respectively, 3·39 and 1·42 gm., the corresponding figures for 1933 being 4·24 and 2·92 gm. In counts made in 1933, the percentage of infected plants shown by the Glasnevin Sonas, Sonas Marvellous, Potato, Glasnevin Ardri, Glasnevin Success, and Victory II varieties was, respectively, 0·5, 1, 2·5, 7·9, 9, and 12·5 per cent., the corresponding figures in 1934 being a trace, and 1, 3·4, 1·2, 4·25, and 1·5 per cent. In small-scale tests in 1932, seed treatment with ceresan slightly increased establishment and reduced the number of diseased plants in the braird. In 1933, treatment with ceresan, agrosan, and alvit gave mean establishment figures (three varieties together) of 100·39, 101·94, and 99·22 (108 grains sown per plot), as compared with 91·11 for the controls, the corresponding figures for the mean numbers of primarily infected plants per plot being 0·95, 3·22, 0·61, and 11·45. The treatments did not, however, significantly increase the mean yields of grain.

In 1937, treatment of heavily infected Star oats seed with ceresan, agrosan, and abavit gave, respectively, 1075, 1066, and 1057 established plants per plot (279 grains), as compared with 977 in the control; infection averaged under 1 per cent. in the treated plots as against 42 per cent. in the untreated. The average increase in yield of dressed grain due to treatment amounted to approximately 25 per cent., while in 1939, when the experiment was repeated, using a new powder, abavit T.B. 910, in place of abavit, it was about 13 per cent.; in neither year was there any significant difference between the three treatments in

respect of disease control or effect on productivity. The highest primary infection was noted on plants grown from seed obtained from localities with a high rainfall.

These results indicate that the seed treatment of oats against *H. avenae* controls infection satisfactorily, but it does not always give any high increase in the yield of dressed grain when the conditions are such that the plant establishment from untreated seed is not less than approximately 80 per cent. of that from treated seed. Little evidence was obtained that seed dusting stimulated seedling growth. It is, however, prudent even under very favourable conditions to disinfect oat seed before sowing, as disinfection serves as a precaution against high leaf spot infection, particularly when cold, wet weather supervenes, and enables sowing to be carried out earlier.

Turner (Miss E. M.). **The reaction of Oats to different strains of Ophiobolus graminis.**—*Trans. Brit. mycol. Soc.*, xxiv, 2, p. 267, 1940.

Isolations from oats stubble affected by take-all in Wales yielded a fungus indistinguishable in culture from *Ophiobolus graminis* on wheat, to which oats are usually held to be resistant [*R.A.M.*, xvi, p. 736]. Four varieties of oats, highly resistant to strains of the fungus from wheat, proved very susceptible to the isolates from oats. Ascospores of the oats strain measured 98 to 117 μ in length compared with 79 to 96 μ for that from wheat. A new variety of *O. graminis* would thus appear to be concerned in the attack on oats, which are invaded in exactly the same way as wheat, the protoplasmic resistance opposed by the root cells to the common wheat strain of the fungus failing to operate in this case. The effect of extracts from the roots of wheat and oats on the isolates under observation was tested. The strains from oats made uniformly good growth, whereas those from wheat made no growth in untreated or steamed oat extract, or in the sediment left after centrifuging the extract. The wheat isolates, however, grew fairly well in oat extract passed through an L5 filter candle and in the supernatant liquid obtained by centrifuging, besides developing freely in wheat extract. It is concluded that the solid portion of oat extract contains a substance toxic to the fungus isolated from wheat.

Wilcomb (H. H.). **Compatible and non-compatible mixtures of sprays and dusts.**—*Calif. Citrogr.*, xxv, 11, p. 348, 1940.

The author gives a list of compatible and non-compatible plant protectives for use against specified diseases and pests of citrus. The substances include citrus petroleum oils, lime-sulphur solution, lime-sulphur and oil, ammonium polysulphide, nicotine sulphate sprays and dusts, tartar emetic (antimony potassium tartrate), sulphur, zinc, and copper compounds, cryolite (sodium fluoaluminate), DN (dinitro-ortho-cyclohexylphenol), and other less used mixtures.

Streets (R. B.). **An apparently undescribed storage rot of Grapefruit.**—Abs. in *Phytopathology*, xxx, 9, p. 789, 1940.

The only external symptoms of an apparently undescribed rot observed in April, 1939, in Arizona grapefruit held in cold storage were

a blackening and loosening of the button and a slightly 'brassy' colour of the peel, but longitudinal sectioning in the early stages revealed a browning of the vascular bundles, which developed, a week to a fortnight after the removal of the fruit from storage, into a dark brown rot, involving several of the segments, while in an advanced stage of infection the peel and ultimately the entire fruit were enveloped in a pliable, dark brown decay. A mildly to definitely unpleasant flavour was a feature of the disease in all its phases. The discoloured internal tissues were filled with the dark mycelium and spores of *Alternaria citri* [*R.A.M.*, xv, p. 716; xvii, pp. 25, 389]. The percentage of infected fruits was small, but the difficulty of detecting and removing them in the packing-house lends the disease a certain importance.

Littauer [F.]. **Research work in Citrus wastage.** *Hadar*, xiii, 1, pp. 21, 26, 1940.

More stringent sanitary precautions are stated to be essential for the control of the two most important fungal rots of citrus in Palestine, namely, green mould (*Penicillium digitatum*) and stem-end rot (*Diplodia natalensis*) [*R.A.M.*, xix, p. 88], the chief measures against the former organism being concerned with the cleansing of field boxes, packing-houses, and so forth, while the clearing-up of all dead wood and twigs from the grove is the main line of attack against the latter. Chemical treatment of the fruit, e.g., with 5 per cent. washing soda, considerably reduces the amount of wastage but cannot replace thorough field sanitation. Results to date have shown the necessity for curtailment of the period between picking and shipment, any prolongation of which, especially in the warm weather at the end of the season, leads to the development of rot and the consequent arrival of the fruit in bad condition at its destination, even with satisfactory transit facilities. A clear-cut correlation has further been established between the number of *P. digitatum* spores on the fruit and the amount of wastage, few spores involving only a low percentage of decay even at high temperatures, whereas large numbers increase the incidence of rot. The wilting period should be of medium duration, blemishes tending to develop if it is too short while undue protraction enhances liability to infection.

Viégas (A. P.). **Notas sôbre Septobasidium pseudopedicellatum Burt o causador dum dos feltros dos Citrus no Estado de São Paulo.** [Notes on *Septobasidium pseudopedicellatum* Burt, the agent of Citrus 'felts' in the State of São Paulo.] —*Bol. téc. Inst. agron., Campinas*, 79, 7 pp., 6 figs., 1940.

An account is given of the morphological characters and cytological development of *Septobasidium pseudopedicellatum*, which forms a smooth, grey coating ('felt') over the branches, fruit peduncles, petioles, and lower leaf bases of citrus trees in association with coccids [? *Lepidosaphes pinnaeformis*] in São Paulo, Brazil [*R.A.M.*, x, p. 654; cf. also xv, p. 59]. The writer agrees with Couch [ibid., xviii, p. 59]'as to the detrimental effects of the insect-fungus partnership, in its later stages, on the common host, and urges growers to combat it in the local orange groves. When oviposition coincides with the germination of the probasidia, the bulk of the population, if not all, becomes inoculated with the secondary

spores of *S. pseudopedicellatum*. The larvae, traversing the hymenium, settle at the edge of the colony, protected by the subiculum, where they are gradually permeated by the anastomosing hyphae of the fungus, a process involving the extension of the 'felt'. Larval infection has been observed to take place in September or October, after the first rains.

Higgins (B. B.). **Outbreak of Ascochyta blight of Cotton in Georgia.**—*Plant Dis. Reptr*, xxiv, 15, pp. 327–328, 1940. [Mimeographed.]

During July and August, 1940, cotton in some parts of Georgia showed severe infection by *Ascochyta gossypii* [*R.A.M.*, v, pp. 599, 722; ix, p. 240], the leaf spot phase being prevalent throughout the Piedmont and Upper Coastal Plain sections and the stem-lesion phase being noted in Fayette, Spalding, Pike, and Polk Counties. The most severe damage was found in Fayette County, where in certain fields 50 to 90 per cent. of the plants showed stem lesions, and the tops of many were dead. Affected leaves frequently showed pale interveinal areas suggestive of potash deficiency, but analysis of the soils from two badly affected fields showed abundant potassium present.

The first report of the disease was on 12th July, during a period of almost unbroken rain from 3rd to 17th of the month. During the first nine days of this spell, the daily sunshine amounted to less than an hour. The temperature for the period was also abnormally low; on 6th July, for example, it ranged from 61° to 67° F. The disease appears to have been recorded in Georgia only on two previous occasions, in 1914 and 1922. When the rains terminated, the affected leaves fell, and the condition became scarcely noticeable.

With reference to Elliott's suggestion that rotation might control the disease [ibid., ii, p. 216], it is pointed out that the most severely affected field was in wheat followed by cowpeas in 1939.

Miller (P. R.) & Weindling (R.). **A survey of Cotton seedling diseases in 1940 and the fungi associated with them.**—*Plant Dis. Reptr*, xxiv, 13, pp. 260–263, 1 map, 1940. [Mimeographed.]

A further survey of cotton seedling diseases in the United States, carried out in 1940, a season with exceptionally late cold spells [*R.A.M.*, xviii, p. 25], showed that *Glomerella gossypii* was again the predominant organism on seedlings affected with damping-off in the eastern region, whereas in Texas and Oklahoma the fungus occurred on only 4·2 per cent. of the seedlings, compared with 40·6 per cent. for the area east of them. This indicates that *G. gossypii* is of minor importance as a damping-off pathogen in Texas and Oklahoma, though present there in 29·7 per cent. of the fields, as against 89 per cent. for the other States surveyed. Though again broadly distributed in the south-eastern States the fungus was limited to the eastern parts only of Texas and Oklahoma. This distribution coincides with that of the fungus on cotton bolls the previous year [ibid., xix, p. 212].

Of the other fungi isolated, *Fusarium moniliforme* [*Gibberella fujikuroi*], *Rhizoctonia* [*Corticium*] *solani*, *Fusarium* spp., *Alternaria* spp., and *Diplodia gossypina* occurred in 19·3, 1·6, 12·5, 3·5, and 0·6 per cent. of the seedlings, respectively.

Emmons (C. W.). **Medical mycology.**—*Bot. Rev.*, vi, 9, pp. 474–514, 1940.

Many of the papers included in the bibliography of 311 titles following the author's valuable survey of the present status of knowledge concerning the relations between mycology and clinical medicine have been noticed from time to time in this *Review*. A plea is made for closer co-operation between doctors and mycologists in a hitherto somewhat neglected branch of science of interest and importance to both parties.

Doub (H. P.). **The roentgenologic aspects of bronchomycosis.**—*Radiology*, xxxiv, 3, pp. 267–275, 5 figs., 1940.

A description is given of some of the more significant pathological changes in the bronchi and lungs revealed by X-ray examination in cases of bronchomycosis associated with blastomycosis, actinomycosis, moniliasis, streptothricosis, and infection by species of *Aspergillus*, *Penicillium*, *Mucor*, and *Oidium coccidioides* [*Coccidioides immitis*: cf. *R.A.M.*, xvii, p. 529; xix, pp. 93, 704]. As a rule the roentgenological diagnosis of fungal invasion requires supplementary confirmation by microscopic study and culture of the sputum, a matter of great importance in view of the liability of confusion between this group of disorders and tuberculosis [ibid., xix, p. 217].

Reeves (R. J.). **The roentgenologic significance of bronchomycosis: case reports.**—*Sth. med. J.* (*J. sth. med. Ass.*), xxxiii, 4, pp. 361–366, 5 figs., 1940.

With a view to stimulating more diligent search for bronchomycoses by means of X-rays [see preceding abstract], the writer describes six cases investigated at the Duke Hospital, Durham, North Carolina, all but one of which gave definite indications of fungal involvement (actinomycosis, blastomycosis, a *Monilia* pathogenic to white rats, *Oidium*, and *M.* [*Candida*] *albicans*). The frequent simulation of tuberculosis and the importance of repeated sputum cultures are emphasized.

Kennedy (C. B.) & Howles (J. K.). **Black hairy tongue: a report of three cases.**—*Arch. Derm. Syph., Chicago*, xlii, 4, pp. 566–569, 1 fig., 1940.

Monilia [*Candida*] *albicans* was isolated on Sabouraud's medium at New Orleans in two out of three cases of black hairy tongue [cf. *R.A.M.*, v, p. 301], the patients (males) having laid their cigarettes on wood covered with a similar black growth while working out-of-doors. Reference is made to a fully documented survey of the available information on this disorder by G. Swinburne of Melbourne (*J. Laryng.*, liv, 7, pp. 386–405, 8 figs., 1939).

Pennington (Edna S.). **A study of the incidence of air-borne molds and of skin sensitivity to molds.**—*Sth. med. J.* (*J. sth. med. Ass.*), xxxiii, 9, pp. 931–938, 3 graphs, 1940.

Daily mould counts were made in August and September, 1937, and from March to the onset of frost in 1938 and 1939 at Nashville, Tennessee, plates of modified Sabouraud's medium being exposed for 10-minute periods. Species of *Alternaria* and *Hormodendrum* predominated

[*R.A.M.*, xix, p. 706], though *Aspergillus*, *Penicillium*, *Mucor*, and *Rhizopus* were also commonly present. In 1937 the *Alternaria* spores reached a peak of 32 per cu. yd. of air on 16th September, and again on 7th October (63). The total mould spore count was made from slides exposed from 1st May to the end of October, 1939. The highest count for any single spore for any day was attained by *H.*, which reached a peak on 12th July of 156 per cu. yd.; the totals for the season were *H.* 1,464, *A.* 744, *Spondylocladium* 122, *Acrothecium* 110, *Fusarium* 96, and *Helminthosporium* 83.

Of 526 patients suffering from seasonal or chronic hay fever and asthma tested intradermally with various mould extracts, 32·5 per cent. gave two plus (abnormally strong) reactions to one or more such extracts and 53·4 per cent. one plus (ordinary positive) reactions. Of the extracts used a commercial preparation of *Hormodendrum* extract produced the most marked reactions, followed by extracts of maize smut [*Ustilago zeae*: loc. cit.], *Penicillium*, *Alternaria*, *Mucor*, *Cephulothecium* [*Trichothecium*] *roseum*, *Monilia sitophila*, *Aspergillus fumigatus*, and *A. niger*. Of 518 patients tested with five strains of *Alternaria*, 36·9 per cent. reacted positively.

Da Fonseca (O.). **Sur l'état actuel de la question des chromoblastomycoses.** [On the present position of the question of chromoblastomycoses.]—*Pr. méd., 1940*, 12, pp. 133–134, 7 figs., 1940.

This is a summing-up of the position to date with regard to the taxonomic status of the chromoblastomycoses, American cases of which are stated to be due to one of four fungi, viz., *Phialophora verrucosa*, *Fonsecaea* or *Hormodendrum pedrosoi*, *H. compactum*, or *H. langeroni* [*R.A.M.*, xvi, p. 812; xix, p. 406], most commonly *H. pedrosoi*. Pending comparative systematic studies between *H. rossicum* [ibid., xviii, p. 109], *H. japonicum*, *Hormiscium dermatitidis* [ibid., xvii, p. 320], and *Torula poikilospora* [ibid., xvi, p. 384], on the one hand, and the organisms associated with diseases of comparable types in the New World on the other, no definite conclusion can be reached regarding the taxonomic position of the Russian and Japanese pathogens.

Bonne (C.). **Conserveering in glycerine van Hormodendrum pedrosoi Brumpt, de schimmel der chromoblastomycose.** [Preservation in glycerine of *Hormodendrum pedrosoi* Brumpt, the chromoblastomycosis fungus.]—*Geneesk. Tijdschr. Ned.-Ind.*, lxxx, 1, p. 26, 1940.

In September, 1939, the writer received at the Batavia (Java) College of Hygiene two tubes of glycerine containing tissues from an abscess above the left knee of a colleague's patient. From this material, which had been at least six days in transit, *Hormodendrum pedrosoi* [see preceding abstract] was readily isolated on Sabouraud's medium and identified by the Centraalbureau voor Schimmelcultures. The preservative properties of glycerine are of interest in this connexion for cultural purposes.

Muskatblit (E.). **Favus : report of six cases.**—*Med. Rec., N.Y.*, cli, 6, pp. 187–192, 4 figs., 1940.

Achorion schoenleini was isolated from six cases of favus of the scalp

treated at the New York University College of Medicine from 1930 to 1933. The fungus was cultured on Sabouraud's glucose (4 per cent.)–peptone (1 per cent.)–agar (1·8 per cent.) medium, on which it made slow growth, reaching a diameter of 1½ in. in six weeks; the surface of the brown, convoluted colonies was partly smooth and partly powdery, with spots of whitish velvety down (incipient pleomorphic degeneration), and penetration into the medium was deep, causing one or more radial cracks. Transferred to Sabouraud's 'conservation' medium (3 per cent. peptone, 1·8 per cent. agar, and no sugar), the colonies remained light brown, with a smooth, waxy surface. The fungus showed considerable vitality, one-year-old cultures being successfully transplanted, while one strain is still alive after repeated transfers during a five-year period. The mycelium presented a number of bizarre aspects, including terminal divisions of the hyphal branches into two or three short branches resembling horns and candlesticks, knob-like swellings at the hyphal tips, and pectinate bodies. Three types of spores developed, the most numerous being spherical or ovoid, terminal or intercalary chlamydospores; the spherical, ovoid, piriform, or cylindrical conidia were attached to the sides of simple, unbranched, or slightly branched conidiophores; there were also a few poorly developed spindle-shaped spores with one or two transverse septa.

Levin (E. A.). **Tinea capitis on the Pacific coast.**—*Calif. West. Med.*, lii, 5, pp. 221–222, 1940.

Microsporon lanosum [*R.A.M.*, xviii, p. 393 *et passim*] was isolated on Sabouraud's medium (1 per cent. peptone, 1·5 per cent. agar, and 4 per cent. maltose) from 48 out of 58 cases of tinea capitis investigated at the Mount Zion Hospital, San Francisco; one of the remainder yielded *Achorion schoenleini* [see preceding abstract], two gave unidentified fungi, and seven cultures were negative or contaminated.

Batchvarov (B.) & Stoïanov (S.). **Chéilite trichophytique.** [Trichophytic cheilitis.]—*Bull. Soc. franç. Derm. Syph.*, xlvii, 1, pp. 15–19, 2 figs., 1940.

Full details are given of a case of cheilitis due to *Trichophyton violaceum* involving the hands, nails, face, and lips of a 28-year-old farmer in Bulgaria, features of interest in connexion with the disorder being its lengthy duration (20 years), exacerbation of the symptoms in hot weather, and the unusual site of infection on the lips.

Lubchenco (A. E.). **Mycotic infection in northeastern Colorado.**—*Rocky Mtn med. J.*, xxxvii, 10, pp. 741–746, 17 figs., 1940.

Three cases of infection by *Trichophyton* ectothrix microides at Sterling, Colorado, are described in detail, one on the arm of an adult and two on the temples of boys. The fungus is differentiated as follows from *Microsporon* spp., with which it is liable to confusion by reason of two factors common to both, namely, a sheath on the hair and small spores in the sheath. In *T.* ectothrix microides the sheath contains groups of spores 3 to 4 μ in diameter, whereas the *Microsporon* spores are polygonal, arranged in a mosaic pattern, and do not form chains, while hyphae are absent; within the hair, the mycelium of *T.* ectothrix

microides is straight or slightly curved, the spores occur in chains or small groups, and the filamentous mycelium terminates in a fringe above the bulb; the *Microsporon* mycelium is wavy, branching, 2 μ in diameter, increasing towards the root and ending in a fringe of Adamson.

RUCHMAN (J.). **Rhinosporidiosis (Seeber) : first occurrence in a female in North America.**—*Arch. Otolaryng., Chicago*, xxx, 2, pp. 239–246, 2 figs., 1940.

A description is given of a case of rhinosporidiosis (*Rhinosporidium seeberi*), the fifty-sixth to be reported, the eighth recorded in North America [*R.A.M.*, xix, p. 704], and the first in that region affecting a female.

KUGLER (W. F.) & REMUSSI (C.). **Algunas caracteristicas morfológicas, fitopatológicas y de resistencia a las heladas en variedades agrícolas de Lino cultivadas en la Estación experimental de Pergamino, durante los años 1937 y 1938.** [Some morphological, phytopathological, and frost-resistant characters of the agricultural varieties of Flax cultivated at the Pergamino Experiment Station during the years 1937 and 1938.]—*Publ. Estac. exp. Pergamino* 2, 60 pp., 9 figs., 1939. [English and German summaries. Received November, 1940.]

The following data were obtained in two years' experiments at Pergamino, Argentina, on the reaction to wilt (*Fusarium lini*), rust (*Melampsora lini*), and 'pasmo' (*Phlyctaena linicola*) [*Sphaerella linorum*: *R.A.M.*, xix, p. 707] of 319 varieties and strains of flax, some indigenous and others obtained from different parts of the world. During 1938, wilt was exceptionally severe, causing losses of 30 per cent. and upwards in the stands and reducing germination in susceptible varieties by up to 90 per cent. Apart from a few American varieties, most of those of foreign origin were susceptible, whereas the indigenous lines proved generally resistant, especially 330 and 6906 M.A.

Rust was equally prevalent in both the experimental years, and the only resistant varieties were (Wis. 15) Bombay C.I. 42 and Punjab (Indian type) C.I. 20.

None of the varieties under observation exhibited a noteworthy degree of resistance to *S. linorum*.

FLOR (H. H.). **Soil sickness of Flax in North Dakota.**—*Phytopathology*, xxx, 9, pp. 749–760, 1 fig., 1 graph, 1940.

A tabulated account is given of experiments at Fargo, North Dakota, in 1938 to determine the relation of fungal infection to the 'soil-sickness' complex of flax, as indicated by the development of pathogenic organisms from roots and hypocotyls dug at two- or three-day intervals and plated on potato dextrose agar in Petri dishes. Of the soil-borne organisms considered to be involved in soil sickness, *Fusarium lini* [*R.A.M.*, xvii, p. 395] was responsible for the earliest infection (11 days after sowing) of both wilt-resistant (e.g., Bison) and wilt-susceptible (e.g., Damont) varieties, and in view of this fact and of the preponderance of the fungus in the cultures (425 isolations as compared with 15 of *Alternaria* spp., 16 of *Thielavia* [*Thielaviopsis*] *basicola*, and

4 of *Rhizoctonia* spp.) it is regarded as the primary source of the trouble.

Severe injury was obtained in greenhouse tests on seedlings sown in both steamed and non-steamed soil immediately after inoculation with *R.* spp., the effects of which diminished in successive monthly sowings and were practically negligible in the third sowing in non-steamed soil. Similar observations were made in the case of *Pythium* spp. in steamed soil, but in non-steamed farm soil these organisms caused no apparent injury even when the seed was sown directly after inoculation.

Imle (E. P.). **What is the situation in Lily diseases?**—*Gdnrs' Chron. Amer.*, xliv, 8, pp. 246, 250, 1940.

Lily mosaic [*R.A.M.*, x, p. 667; xviii, p. 318; xix, p. 411] not being transmissible through the seed, seedling plants grown in isolated sites afford an excellent source of virus-free bulbs. Growers aiming at the complete exclusion of the disease from their gardens cannot compromise with vegetatively propagated bulbs, except possibly those of *Lilium pardalinum, L. hansoni, L. martagon*, and the Backhouse hybrids. There are, however, two other groups the cultivation of which is open to those willing to harbour the virus, viz., the tolerant, including *L. umbellatum, L. elegans, L. candidum, L. testaceum, L. sargentiae, L. speciosum, L. tauricum, L. bulbiferum, L. regale* and most of its hybrids, and *L. tigrinum*, and the resistant or immune *L. henryi* and the others mentioned above in connexion with vegetative propagation.

L. candidum and *L. testaceum* are subject to severe damage from bulb rot [unspecified], and should not be planted in sites previously occupied by lilies. Sound bulbs in infected beds should be dug when dormant, immersed for 45 minutes in 1 in 100 formalin, and re-planted in a new situation. *Phytophthora cactorum* and *Erwinia carotovora* also cause decay of the underground stem, while *Botrytis* [*elliptica*: ibid., xviii, p. 443] is responsible for foliar blight, which may be destructive in rainy or cool, foggy weather and is controllable by protective sprays of Bordeaux mixture, applied often enough to cover the new leaves as they form.

Gibson (G. W.) & Gregory (P. H.). **A Phytophthora blight of bulbous Iris.**—*Trans. Brit. mycol. Soc.*, xxiv, 2, pp. 251–254, 5 figs., 1940.

Since 1928 a leaf blight of bulbous iris (mostly hybrids of *Iris xiphium* and *I. tingitana*) has been observed in the Scilly Isles on the Wedgwood, Imperator, and White Excelsior varieties, and near Penzance on Jacob de Wit. The disease develops in patches several feet in diameter, a severe attack being easily recognizable from a distance. The lower leaves of the affected plants bend over until their ends touch the ground, exposing the pale green, concave inner surface. Closer inspection shows the point of collapse to coincide with the site of necrotic lesions on the outer surface. The younger leaves, higher up on the plant, often bear similar lesions. The whitish spots spread rapidly up and down the foliage: their origin near the bases of the older and outer leaves may be attributable to the retention of water in abundance between the sheathing leaf bases and the stem. The lesions are sharply delimited by parallel vascular bundles along the length of the leaf, but their transverse ends merge indefinitely into the sound tissue. Within the narrow, pale

yellowish-green zone at the transverse ends of the lesion is a light purplish-brown or greyish-white area, contrasting sharply along the longitudinal edge with the normal dark green of the foliage. The extreme tips of the leaves are not infected, but they wither in the presence of extensive lesions lower down. On the inner leaf surface the lesions are purplish-grey and relatively inconspicuous. Towards the end of the growing season (in Wedgwoods), the lower lesions extend down below soil-level towards the new bulbs formed within the shrivelled skin of the parent bulb. The prominent, dark purplish-brown lesions developing on the blanched surface of the lower sheathing leaf bases and stem contain large hyphae, rich in protoplasm, which may reach the young bulbs and overwinter on them, causing fresh outbreaks of infection in the spring. Spread from plant to plant is fairly slow, diseased bulbs left in the soil giving rise to blighted patches the following season; the plants in these areas are often very stunted and tend to die out.

The causal organism of the disease, characterized by beaked, applanate sporangia, 37 to 66 by 24 to 40 μ, borne in compact clusters on short sporangiophores, furnished with short, occluded pedicels, and containing feebly motile zoospores, 8 to 12 μ in diameter, was tentatively identified by S. F. Ashby as a species of *Phytophthora* related to *P. cyperi-rotundati* [*R.A.M.*, vii, p. 273]. Overwintered leaves bore oogonium-like bodies, 32 to 44 μ in diameter, containing structures 27 to 35 μ in diameter presumed to be oospores; no antheridia were detected, so that the connexion between these elements and the iris pathogen could not be established. Attempts to culture the organism and inoculation experiments gave negative results.

In addition to plant sanitation measures, it is suggested that light applications of a fungicide might be effective against the blight in outdoor plants, while under glass the avoidance of overhead irrigation appears to have prevented infection, but methods of control have not yet been fully worked out.

JEFFERS (R. H.). **Gladiolus diseases. II. Gladiolus dry rot (Sclerotium gladioli). III. Gladiolus hard rot (Septoria gladioli).**—*Gladiol. Annu., 1940*, pp. 28–30, 1940.

Popular notes are given on the symptoms and control of the dry and hard rots of gladiolus (*Sclerotium* [*Sclerotinia*] *gladioli* and *Septoria gladioli*, respectively) in Great Britain. Since *Sclerotinia gladioli* [*R.A.M.*, xiii, p. 581; xviii, p. 726; xix, p. 559] persists in the soil for at least four years, the host should be excluded from the rotation on their original site for this period wherever contamination is suspected. Only sound corms should be used for planting, and during the growing season all affected plants should be pulled up and burnt. The corms should be carefully examined for signs of infection, not only at lifting but also during storage; their immersion in mercuric chloride is stated to have given good results but the method is not recommended for amateur growers.

Control measures against *Septoria gladioli* [ibid., xiii, p. 493; xvii, p. 113] should be directed towards the prevention of the spread of infection from diseased to healthy leaves by means of the spores and of the infection of the corms by mycelium in the soil. For the former

purpose weekly applications of Bordeaux mixture to the foliage from mid-July to the end of August or early September have been found satisfactory, while the selection of corms and the utilization of new sites are the only practicable measures against soil infection.

Tisdale (W. B.). **Did Botrytis actually cause Gladiolus blight in Florida?**—*Plant Dis. Reptr*, xxiv, 14, pp. 285–287, 1940. [Mimeographed.]

The gladiolus blight attributed by Dimock to *Botrytis cinerea* [*R.A.M.*, xix, p. 539] was evidently, from his description of the symptoms, the identical disease investigated by Florida plant pathologists during March and April, 1940, and found to show no consistent association with any organism, an observation corroborated by the examination of growers' samples at the Bureau of Plant Industry. Several exceptional environmental factors were in operation during the outbreak, but so far there is no evidence to prove either that they intensified the severity of infection, or that *B. cinerea* (unless the existence of an unfamiliar strain is postulated) was primarily concerned in the development of the blight.

Tompkins (C. M.) & Hansen (H. N.). **Tulip anthracnose.**—Abs. in *Phytopathology*, xxx, 9, p. 790, 1940.

Darwin tulips (*Tulipa gesneriana* var. *darwinia*) are affected at Burlingame, California, by anthracnose of the leaf blades and peduncles. Water-soaked, later dry, black-edged, elliptical lesions of varying size are formed parallel to the long axis of the peduncle. The fungus isolated from the diseased tissues on potato dextrose is regarded as a new form (*tulipae*) of *Gloeosporium thumenii* [but is not described]. Inoculation experiments with spore suspensions gave positive results after an incubation period of 7 to 10 days on young tulip plants, reisolates from which were likewise pathogenic. In nature, the Reverend Eubank and Zwanenburg varieties are highly susceptible, while Clara Butt and Fantasy (a parrot type) are immune.

Whetzel (H. H.) & Dimock (A. W.). **Sclerotinia sclerotiorum on Calceolaria.**—*Plant Dis. Reptr*, xxiv, 14, pp. 284–285, 1940. [Mimeographed.]

Sclerotinia sclerotiorum was isolated from *Calceolaria* plants in western New York suffering from a wilt of the leaves, some of which showed irregular, necrotic areas extending from the petiole into the lamina; the stems were dry and crumbly and the pith was replaced by the cottony mycelium and black sclerotia of the pathogen. Apothecia were formed on sclerotia in the soil and cinder substratum upon which the pots were placed. At least 75 per cent. of the grower's stock of several thousand plants suffered from the disease.

Sampson (Kathleen) & Western (J. H.). **Two diseases of grasses caused by species of Helminthosporium not previously recorded in Britain.**—*Trans. Brit. mycol. Soc.*, xxiv 2, pp. 255–263, 2 figs., 1940.

A disease of perennial rye grass (*Lolium perenne*), *L. multiflorum*, and

Festuca pratensis in England and Wales, characterized by oval, chocolate-coloured spots with white centres or dark streaks 1 cm. or more in length on the leaf blades, sometimes involving complete destruction of the mesophyll and collapse at the site of infection, distorted and discoloured spikes, and bleached glumes, was attributed in 1922 to *Helminthosporium gramineum* [*R.A.M.*, i, p. 422], but has now been found to be due to *H. siccans* [ibid., xiv, p. 515]. The fungus was readily isolated and preliminary inoculation experiments [which are described in detail] clearly indicated that it is able to pass from rye grass to meadow fescue and vice versa, though the problem of its physiologic specialization was not fully investigated.

The average dimensions of the subhyaline conidia from *L. perenne* plants were 109 by 16·5 μ, with 6·7 septa, the corresponding figures for *L. multiflorum* and *F. pratensis* being 95·9 by 13·6 μ and 5·6 septa, and 88·9 by 14·8 μ and 5·3 septa, respectively. In culture the average size of the conidia from *L. perenne* ranged from 55·6 to 72·3 by 13·5 to 15·4 μ, with 3·2 to 4·2 septa, those from *L. multiflorum* from 44·6 to 65·2 by 13·2 to 14·3 μ, with 3·1 to 4·3 septa, and those from *F. pratensis* from 53·9 to 78·2 by 11·2 to 14·9 μ, with 3·9 to 4·6 septa. Drechsler's measurements for *H. siccans* from both *L.* spp. were 80·1 by 16·8 μ, with 4·9 septa. Most of the conidia from *L. multiflorum* in the Aberystwyth material were of the tapering type, those of *L. perenne* tended towards the cylindrical, while of six cultures of *F. pratensis* three produced tapering and three cylindrical spores.

A fungus causing dark purplish-red lesions, with light brown, finally white centres on the leaf blades of *Poa pratensis* at Aberystwyth and on material supplied by Dillon Weston, was identified as *H. vagans* [ibid., ix, p. 596], soil inoculation experiments with which gave positive results on the same host only. In pot experiments the pathogen caused the formation of brown lesions on the white underground rhizomes and obviously interfered with the natural spread of the plant. The average dimensions of the conidia from *P. pratensis* plants (Aberystwyth) were 132·5 by 18·2 μ, with 10·2 septa, the corresponding figures for those from tap water agar being 69·5 by 17·8 μ, with 5·5 septa, and for Drechsler's specimens 82·7 by 19·1 μ, with 6·3 septa. Unlike *H. siccans*, *H. vagans* grows rather slowly in culture, forming on potato dextrose agar an olive-green aerial mycelium with few spores, which developed in larger numbers, though still somewhat sparsely, on tap water agar.

Glasscock (H. H.). **Blind seed disease of Rye-Grass.**—*Nature, Lond.*, cxlvi, 3698, pp. 368–369, 1940.

Examination of 27 samples of rye grass [? *Lolium perenne* and/or *L. multiflorum*] seed from east Kent showed that 25 contained seeds which bore on the caryopsis conidia agreeing with those described by Neill and Hyde as being produced by the blind seed fungus [*Helotium* sp.: *R.A.M.*, xviii, p. 601; xix, p. 709]. Cultures and selected seeds were sent to Neill, who expressed the opinion that the former appeared to be identical with those obtained in New Zealand, and that the latter were typically affected. This evidence indicates that the condition is widely prevalent in east Kent. Infected seeds sown in pots of sterilized soil in a glasshouse produced apothecia agreeing with the description of those

seen in New Zealand and exactly like those figured by Muskett and Calvert.

GOTO (K.). **Sclerotinia libertiana on Buckwheat.**—*Ann. phytopath. Soc. Japan*, ix, 4, pp. 263–265, 3 figs., 1939. [Japanese. Abs. in *Biol. Abstr.*, xiv, 7, p. 1208, 1940.]

Sclerotia detected among buckwheat seed in 1937 were found to be almost identical with those of *Sclerotinia libertiana* [*S. sclerotiorum*], the specific differentiation of which from *S. fagopyri* is regarded as of doubtful validity. The pathogenicity of the buckwheat fungus was demonstrated by inoculation tests.

STEYN (D. G.). **Poisoning of stock by fungus-infected Paspalum grasses.**—*Fmg S. Afr.*, xv, 174, pp. 340, 344, 1940.

Under veld conditions in South Africa poisoning with *Claviceps paspali* following feeding on infested *Paspalum* grass pastures [*R.A.M.*, xviii, p. 460] usually affects only cattle, but feeding tests have shown that horses and sheep are also liable to be poisoned by the fungus, which was found to be more dangerous in its mature than in its sphacelial stage. The same animal can be repeatedly affected by poisoning without becoming resistant. The poison affects the nervous system, leading in severe cases to complete paralysis and death. Recovery may take either a few days or weeks provided the animals are immediately removed from contaminated grass or hay, dosed with a good purgative, and given very strong black coffee. It is pointed out that *Paspalum* grass and hay are of exceptional value for the farmer and that the following preventive measures should be carried out to ward off poisoning: grazing on *Paspalum* pastures should be allowed only as long as the grass is young; pastures should be thoroughly examined for the presence of *C. paspali* before stock are allowed to graze on them, and in cases where slightly or fairly heavily infested pastures must be used by reason of scarcity of food, the animals should be run for a day or two on the infected pasture and then removed for a few days, or the contaminated hay should be mixed with sound material. It should also be remembered that silage is probably less dangerous than fresh infected grass or hay. Those areas in the pastures or those parts of the hay which are heavily infected with the fungus should be removed and burned.

CROWELL (I. H.). **The geographical distribution of the genus Gymnosporangium.**—*Canad. J. Res.*, Sect. C, xviii, 9, pp. 469–488, 43 maps, 1940.

Species of the genus *Gymnosporangium* [*R.A.M.*, xix, pp. 374, 677] are stated to be confined almost entirely to the temperate portion of the northern hemisphere. The genus is composed of 48 species, 33 occurring in North America, 15 in Asia, and 6 in Europe, including north Africa. Each of the three continents has a distinctive *Gymnosporangium* flora, with the exception of three species, *G. aurantiacum*, *G. clavariaeforme*, and *G. juniperinum*, which occur in all three of them. In the North American region two geographical areas are evident. The eastern, extending from the Atlantic ocean to the foot-hills

of the Rocky Mountains, harbours among others *G. clavipes*, *G. juniperi-virginianae*, *G. globosum*, and *G. exiguum*, while in the western region *G. cupressi*, *G. guatemalianum*, and *G. inconspicuum* are of interest. Species of the European region include *G. sabinae*. The *Gymnosporangium* flora of North America is classified in four categories as follows: (i) species that occupy all potential territory covered by the coincident ranges of their alternate hosts, (ii) species restricted by the range of their 'primary' teleuto host, (iii) localized species confined within a portion of the coincident ranges of their alternate host, and (iv) widely distributed species not limited in their range by either alternate host group.

Husz (B.). **Megfigyelések az Almafa törpeszárúságárol.** [Apple rosette in Hungary.]—*Bull. R. Hung. hort. Coll.*, N.S., i, pp. 11–36, 15 figs., 1940. [English summary.]

During the past five years apple trees growing under unfavourable (sub-arid) climatic conditions on black alkali soils of Hungary have been suffering from rosette [little leaf: *R.A.M.*, xii, p. 99], the symptoms agreeing with those described by O. M. Morris in 1923 [ibid., iii, p. 341]. Observations and experiments to date have confirmed the results of American tests demonstrating the non-contagious and non-graft-transmissible character of the disorder, which proved amenable to control, however, by spraying with zinc sulphate from April to July, or by injections of the same compound [ibid., xvii, p. 692], the maximum benefit being secured in an orchard previously fertilized with stable and synthetic manures. Zinc deficiency appears to fall into two categories, permanent and temporary, the latter being largely dependent on weather conditions, such as the sum-total of winter precipitation, evidently the factor responsible for the serious development of little leaf in the spring of 1939.

Bauer (K.) & Huber (G. A.). **The use of calcium cyanamid and other fertilizer materials and soil amendments in the destruction of apothecia of Sclerotinia fructicola with methods of application.**—Abs. in *Phytopathology*, xxx, 9, p. 785, 1940.

Aqueous solutions of ammonium sulphate, sodium nitrate, and urea, though severely injuring the apothecia of *Sclerotinia fructicola* [at the Western Washington Experiment Station: *R.A.M.*, xviii, p. 603] failed to prevent their subsequent development, neither was effective control afforded by the application, immediately before the emergence of the apothecia, of ammonium sulphate, hydrated lime, urea, or calcium carbonate. The fruiting bodies were suppressed only by the use of calcium cyanamide [loc. cit.].

Maier (W.) & Mittmann-Maier (Gertrud). **Monilia cinerea Bon. als Erreger einer Blattkrankheit an Süßkirsche.** [*Monilia cinerea* Bon. as agent of a leaf disease of Sweet Cherry.]—*Angew. Bot.*, xxii, 1, pp. 79–85, 7 figs., 1940.

A wild sweet cherry tree near Geisenheim (Rhine) was observed in May, 1939, to be affected by a foliar and branch wilt, the shrivelled leaves being covered with the yellowish-grey mycelium and spore

pustules of *Monilia cinerea* [*Sclerotinia laxa*: *R.A.M.*, xix, p. 479] and the branches exuding gum. Inoculation experiments with malt agar cultures of the fungus on plums, apricots, and peaches resulted in the development of the typical mycelium of *S. laxa*, whereas apples and pears reacted negatively, or at most very sparsely, to the same treatment. These observations, together with the data from comparative conidial measurements, satisfactorily established the identity of the organism with *M. cinerea* [*S. laxa*]. The conidia of *S. laxa* from sweet cherry leaves on apple, pear, and peach measured 14·8 ± 1·1 by 10·7 ± 0·9, 16·3 ± 1·5 by 12·2 ± 1·1, and 17·9 ± 1·7 by 13·3 ± 1·2 μ, respectively, those of the same from apricot mummies on the three inoculated hosts 15·8 ± 1·2 by 10·2 ± 0·9, 15·3 ± 1·5 by 10·7 ± 1·1, and 16·3 ± 1·8 by 11·7 ± 1·0 μ, respectively, and those of *M.* [*S.*] *fructigena* from apple on apple, pear, and peach 21·4 ± 1·8 by 14·3 ± 1·3, 20·4 ± 1·7 by 13·8 ± 1·3, and 20·4 ± 2·5 by 14·3 ± 1·4 μ, respectively (means of 200 in all cases).

The sweet cherry leaf strain of *S. laxa* is characterized in malt agar cultures by scanty conidial production and an abundance of chlamydospores of the most diverse shapes and sizes, non- or uniseptate, elongated, filiform elements or concatenate spores, separated by short segments of mycelium, indistinguishable from the conidia.

Evidence was obtained that infection originates in leaves of varying stages of maturity and thence proceeds to the petiole and branch, girdling the latter, with consequent wilting. Brown, expanding lesions, similar to those observed in nature, were formed in a few days on the leaves of cut cherry branches sprayed with a conidial suspension of the fungus and held at 20° to 22° C. in a moist chamber. On removal to a drier atmosphere the leaves shrivelled. Concentric zones, resembling those formed in culture, developed on some of the leaves, but no conidial cushions. The invasion of the pathogen was followed through the petiole into the branch.

This is believed to be the first record of a foliar-wilt of cherries due to *S. laxa* in Germany, or Central Europe generally. The potentialities of the disease are serious, but their realization is likely to depend on the prevalence of propitious weather conditions, especially in regard to humidity.

Reeves (E. L.). **Rusty-mottle, a new virosis of Cherry.** Abs. in *Phytopathology*, xxx, 9, p. 789, 1940.

The binomial *Marmor rubiginosum*, following Holmes's system of virus nomenclature [*R.A.M.*, xviii, p. 607], is proposed for a graft transmissible disease of sweet cherries, commonly known as 'rusty mottle', characterized by a chlorotic mottling of the small basal leaves developing four or five weeks after full bloom and the subsequent rapid appearance of late-season colours ranging from bright yellow to red. The symptoms gradually extend to the older leaves, and during the seventh and eighth weeks after full bloom 30 to 70 per cent. of the foliage is shed. At this juncture the mottling of the remaining leaves becomes more intense, and yellowish-brown areas impart a generally rusty aspect. Affected trees bear small, late-maturing, and insipid fruits, and there is a slow decline of vitality. The disease, which is attributed on the basis of the available evidence to a virus, has repeatedly

been transmitted during the last five years by various methods of grafting, but not by juice inoculation.

Woods (M. W.) & Haut (I. C.). **Mild streak disease of Black Raspberries in Maryland.**—*Plant Dis. Reptr*, xxiv, 16, pp. 338–340, 1940. [Mimeographed.]

In some Maryland black raspberry [*Rubus occidentalis*] plantings the most destructive disease is mild streak [*R.A.M.*, xii, p. 230], which occurs locally on the Cumberland, Logan, Dundee, Black Diamond, Naples, Quillen, Evans, Bristol, and Shuttleworth varieties, but not on Black Beauty, even when growing in close proximity to severely infected bushes.

The condition is not easily detected. The cane symptoms are most readily recognized during a period that extends from shortly before the fruit ripens until the new canes begin to show a normal colour. The streaks (which are often found within about 1 ft. of the ground on new canes, but which may develop on laterals or just behind the tips) are purple to violet and usually pronounced on Dundee, Bristol, and Logan, greenish-brown on Naples, and bluish, but generally very distinct, on Evans. They appear as single lines, but in reality are narrowly elliptical, enclosing, as a rule, a small central island of apparently normal surface. If the bloom is rubbed away, the epidermis appears water-soaked and discoloured. Sometimes only a few isolated streaks are present, but the entire cane may be so heavily streaked as to appear water-soaked all over. In many instances the streaks are exceedingly faint. The leaves near the tips of the new canes are often slightly curled. Vein-clearing is frequently present. The berries are lustreless, dry, and of poor flavour. If an inspection is made at or after mid-season, the condition can be diagnosed in the year the plants are set. Leaf symptoms are of special value in identification on young plants. In some varieties, such as Cumberland and Dundee, the leaves on the new canes are curled, and have a greasy, rugose appearance, the latter symptom also being apparent sometimes on older plants. Vein-clearing of leaves formed on the 'handles' is a valuable aid to detection in young sets. With Dundee and Cumberland the old 'handles' should be allowed to remain until they leaf out, so that affected plants can be detected by the vein-clearing symptom and rogued out.

Field evidence indicated that the condition may spread rapidly over distances up to 20 ft. and slowly over greater distances (about 200 ft.). The disease is likely to become a serious factor in raspberry production. Roguing is considerably more difficult than for any other raspberry virus disease. Inspections must not be made too early in the season, and attention must be given to varietal differences in symptom expression. A very thorough hill-by-hill inspection must always be made.

Stevens (H. E.). **Papaya diseases.**—*Proc. Fla hort. Soc.*, lii, pp. 57–63, 1939. [Abs. in *Biol. Abstr.*, xiv, 7, p. 1209, 1940.]

The chief diseases of papaw in Florida, viz., leaf blight (*Pucciniopsis* [*Asperisporium*] *caricae*) [*R.A.M.*, xvii, p. 17; xviii, p. 478], powdery mildew (*Oidium*) [*caricae*: ibid., xviii, pp. 506, 712], damping-off (*Rhizoctonia* sp.), and fruit rot (*Colletotrichum* [? *gloeosporioides*: ibid.,

xix, p. 663]) are described, and measures for their control suggested. A brief discussion is also given of foreign diseases of the same host, especially those not known to have become established in the United States.

RADA (G. G.). **La enfermedad de la 'antracnosis del Mango'.** [The anthracnose disease of Mango.]—*Circ. Estac. exp. agríc. La Molina* 50, 6 pp., 3 figs., 1939. [Received September, 1940.]

This is a popular description of mango anthracnose (*Glomerella cingulata*) [*R.A.M.*, xix, pp. 611, 663], which is stated to cause severe damage in the Chanchamayo region of Peru with its heavy annual rainfall, and to be present also in the vicinity of Lima, where precipitation is less intensive but the humid and misty atmospheric conditions are favourable to infection. Control may be effected by plantation hygiene, supplemented by the application of 0·75 per cent. Bordeaux plus an adhesive, e.g., ¼ kg. wheat flour or 1 l. skimmed milk per 100 l. of the mixture, the treatments to be given at intervals of two to three days during the blossoming period and thereafter fortnightly or monthly for the protection of the developing fruits.

ARRUDA (S. C.). **Antracnose e cancro das Anonaceas.** [Anthracnose and canker of the Annonaceae.]—*Biologico*, vi, 8, pp. 224–225, 1940.

A representative of the Annonaceae ['fruta-de-conde'] is reported to suffer from two diseases in Brazil, viz., anthracnose (*Colletotrichum gloeosporioides*) [*Glomerella cingulata*: cf. *R.A.M.*, vii, p. 20] and a canker of uncertain origin. *G. cingulata* forms dark chestnut to nearly black, circular or elongated spots on the leaves; sunken, elongated lesions on the young shoots, causing desiccation of the apical portion and the production, below the site of infection, of up to five adventitious buds, which are attacked in turn; and dark chestnut spots on the fruits, inducing rapid decay at maturity. Cotton in Brazil has recently sustained severe damage from *C. gossypii* var. *cephalosporioides*, causing foliar malformation, the production of an excessive number of shoots, and finally complete deformation and sterility [ibid., xviii, p. 798]. This fungus, though morphologically closely similar to *C.* [*G.*] *gossypii*, produces pathological symptoms more suggestive of those observed on the Annonaceae.

The cankers, with which a species of *Fusarium*, other fungi, and a bacterium were associated, cause a cracking of the bark along their entire extent; inoculation tests have so far given negative results.

MCCALLAN (S. E. A.) & WILCOXON (F.). **An analysis of factors causing variation in spore germination tests of fungicides. II. Methods of spraying.**—*Contr. Boyce Thompson Inst.*, ii, 4, pp. 309–324, 4 figs., 5 graphs, 1940.

The object of the present study was to find an accurate method of spraying in laboratory tests of fungicides [*R.A.M.*, xix, p. 665] which would permit the application of a known amount of fungicide to glass slides in a reproducible manner. The following four methods were compared with regard to their relative precision: (*a*) free-hand spraying

with a de Vilbiss No. 15 bulb atomizer; (*b*) free-hand spraying with controlled pressure and time, the atomizer being attached to the laboratory air pressure line and the pressure regulated by means of a manometer; (*c*) various types of stationary horizontal sprayers, of which the most satisfactory was a cellophane-covered chamber with the glass slide mounted about 30 in. from an atomizer nozzle, the spray suspension being stirred continuously, applied at a constant pressure, and the amount of deposit regulated by varying the time of spraying; and (*d*) settling towers. A simple home-made settling tower and a permanently installed stainless steel one were developed, both being 1 ft. square at the base and 5 ft. high. The spray is directed up into the tower, the nozzle then withdrawn, some time allowed for the large drops to settle, and finally the slides inserted on a tray to receive a uniform coating of fine spray. The amount of deposit on the slide can be regulated by the number of exposures. The most satisfactory results in working with the settling tower were obtained with 30 seconds' spraying at 10 lb. pressure, 10 seconds' settling, and 60 seconds' exposure of the slide. The four methods were compared by means of dye tests, brilliant blue being sprayed on the slides, then washed off and the amount determined in a colorimeter. Each method was tested in five replicate tests on different days, on four replicate slides each time, and at four different doses. The coefficients of variation for slides sprayed at the same time and at different times for the four methods, respectively, were (*a*) 16·7 and 85·2 per cent., (*b*) 7·0 and 43·4, (*c*) 5·9 and 30·1, and (*d*) 4·5 and 13·7; the variances for replicate slides within doses, 76 degrees freedom, were (*a*) 148·86, (*b*) 22·57, (*c*) 10·25, and (*d*) 4·33. The differences between the methods were highly significant; thus (*b*) represented a nearly sevenfold increase in precision over (*a*), (*c*) a twofold increase over (*b*), and (*d*) about another twofold increase over (*c*) and a greater than thirtyfold over (*a*).

A comparison of observed deposit of various copper fungicides in the settling tower with that expected from calibration by the dye test showed an average agreement within 5·4 per cent. The results of comparative spore germination tests with the χ^2 test for linearity of dose-effect curve, steepness of slope, and reproducibility as criteria for evaluating precision indicated the settling tower to be the most precise of the four spraying methods tested. It is concluded from dye and spore germination tests that the settling tower method is the most accurate, followed in order by stationary horizontal sprayers, free-hand spraying with controlled pressure and time, and free-hand spraying with bulb atomizer.

Bever (W. M.) & Seely (C. I.). **A preliminary report on a fungus disease of the field Bindweed, Convolvulus arvensis.**—*Phytopathology*, xxx, 9, pp. 774–779, 3 figs., 1940.

A species of *Rhabdospora*, characterized by pycnidia with walls composed of several layers of brown, parenchymatous cells, and hyaline, filiform, straight or slightly curved, pluriguttulate, continuous to uniseptate pycnospores, 35 to 37 by 1 μ, has been isolated from dark brown, hard lesions, up to 2 or 3 in. long, on *Convolvulus arvensis* stems in Idaho and Washington. Infection first shows in the centre of a

bindweed patch, where the plants become diseased and gradually die. Lesions up to 2 or 3 in. in length occur at any point on the stem in close proximity to the soil. The leaves turn yellow or become water-soaked and die, very little seed is set, and there is a reduction in the size of the roots, which in extreme cases may also be attacked. The fungus, not hitherto recorded on the host in question, grows best at 20° C., the minimum and maximum temperatures for its development being 4° and 36°, respectively. It was shown by inoculation experiments to be soil-borne.

Hoagland (D. R.). **Minute amounts of chemical elements in relation to plant growth.**—*Science*, N.S., xci, 2372, pp. 557–560, 1940.

The author discusses, with frequent references to pertinent literature, the growing appreciation of the importance of minute amounts of minor elements in plant nutrition, and stresses the necessity of co-operative research on the part of plant and animal physiologists, soil chemists, and possibly plant breeders, for the study of quality deficiencies in crops, and the feasibility of modifying the quality by commercially practicable procedures.

Bennett (C. W.). **The relation of viruses to plant tissues.**—*Bot. Rev.*, vi, 9, pp. 427–473, 1940.

In the course of this useful review three groups of viruses are distinguished, viz., those restricted to the parenchyma (the smallest group, which includes phony peach virus); those closely associated with the phloem (e.g., raspberry leaf curl and beet curly top viruses); and those which occur in both phloem and parenchyma (e.g., all viruses of the mosaic-producing type). Absence of seed transmission is not surprising with viruses restricted to the phloem, since there is no vascular connexion between the embryo and mother plant. The inability of viruses to enter or remain active in microspores and megaspores is suggested as an explanation of the freedom from seed transmission of viruses which occur in the parenchyma. This hypothesis is supported by the facts that pollen infection is associated with all cases of seed transmission that have been adequately investigated and no virus not seed-transmitted is known to occur in pollen. Most of the papers cited in the four-page bibliography have already been noticed in this *Review*.

Timonin (M. I.). **The interaction of higher plants and soil-micro-organisms. II. Study of the microbial population of the rhizosphere in relation to resistance of plants to soil-borne diseases.** – *Canad. J. Res.*, Sect. C, xviii, 9, pp. 444–455, 2 pl., 1 diag., 1940.

The second contribution to this series [*R.A.M.*, xix, p. 669] contains an expanded account of studies on the microbial population of the rhizospheres of flax and tobacco resistant or susceptible to wilt [*Fusarium lini*] and black root rot [*Thielaviopsis basicola*], respectively, the results of which have already been noticed in part from another source [ibid., xix, p. 422]. Little difference in the abundance of micro-organisms was exhibited by the rhizospheres of the same varieties of oats, mangels, and clover grown in plots receiving no fertilizer and by those receiving 15 tons of farmyard manure per acre, even though the soils varied

greatly in productivity. It is concluded that the type of crop is of much greater significance than the degree of soil fertility in determining the abundance of microbial population in the rhizosphere. Differential counts of fungi and Actinomycetes indicated that colonies developing from spores or conidia represent only small fractions of the total count, namely, 6 to 8 per cent. It was also evident that sporulation is greater in the soil distant from the roots than in the rhizospheres. Examination of contact slides indicated a greater number of micro-organisms in the rhizosphere of flax than in the soil distant from the roots and showed the same differences between the rhizosphere populations of resistant and susceptible varieties as demonstrated by the plating method.

McIntosh (T. P.). **The importance of the variety in Potato production.**—*Gdnrs' Chron.*, Ser. 3, cvii, 2776, pp. 116–117; 2777, p. 132, 1940.

Among the varietal characters of potatoes requiring special consideration in connexion with commercial breeding schemes are such pathological but apparently non-infectious variations as 'bolters' (abnormally tall and late-maturing, with peculiar foliar features) and 'wildings', the late Prof. Murphy's view of which as infected by the witches' broom virus [*R.A.M.*, xvii, p. 833] is not shared by the writer. Certain types of 'wildings' are believed to represent periclinal mutations, whereas the anomalies associated with 'bolting' are of quite a different order. 'Bolters' have been experimentally obtained from normal plants by the use of top cuttings. Notes (based in part on information supplied by G. Cockerham) are given on varietal reaction to virus diseases in Scotland [ibid., xix, p. 670], and on the development of varieties immune from *Phytophthora infestans* and other fungi [ibid., xix, p. 723.].

Trials of Potatoes for immunity from wart disease, 1939.—*J. Minist. Agric.*, xlvii, 2, pp. 135–136, 1940.

A descriptive list is given of six new potato varieties found in trials conducted by the Ministry of Agriculture to be immune from wart disease [*Synchytrium endobioticum*: *R.A.M.*, xix, pp. 320, 564], comprising Doon Castle, Vanguard (early), Doon Bounty, Doon Well (second early), Bellahouston (early maincrop), and Doon Eire (late maincrop).

Bonde (R.), Stevenson (F. J.), & Clark (C. F.). **Resistance of certain Potato varieties and seedling progenies to late blight in the tubers.**—*Phytopathology*, xxx, 9, pp. 733–748, 4 figs., 1940.

Further laboratory and field studies in Maine during 1937–8 on the varietal reaction of potatoes to late blight (*Phytophthora infestans*) [*R.A.M.*, xvii, p. 267] are described and tabulated. In laboratory tests in 1937 Earlaine and Green Mountain proved highly susceptible to tuber infection, whereas Paisley No. 2, President, and Ekishirazu were resistant, though tubers of some lots of the last-named (10 per cent.) underwent a slow decay. The progeny of the cross Paisley No. 2 × Earlaine showed wide variations in reaction to the pathogen, 42·9 per cent. being free from tuber decay, 11·5 developing infection which progressed at a slow rate, while 45·6 fell into highly susceptible Green Mountain

category. Little more resistance was shown by the offspring of Paisley No. 2 × Ekishirazu than by the foregoing. In field experiments in 1938 the parent varieties Russet Rural, Earlaine, and Katahdin and the Green Mountain controls were very susceptible to tuber infection. Hindenburg and Richter's Jubel somewhat less so, while the tubers of the vine-resistant varieties (336–144), (336–18), President, and Paisley No. 2 were not infected. The fact that 22 per cent. of the seedlings derived from selfing Katahdin were resistant to tuber decay is considered to reveal the existence in this phenotypically susceptible variety of a factor for resistance to tuber rot. Evidence was also obtained that Earlaine, like Katahdin, though itself susceptible, evidently carries one or more factors for resistance.

Tuber and vine resistance were found to be correlated in the progenies of Katahdin selfed, Hindenburg × Katahdin, (336–144) × (336–18), and President × Earlaine, but not in those of Paisley × Earlaine or Richter's Jubel × S. 44537. These and other data relative to the grouping of tuber and foliar infections denote that resistance to the two categories is conditioned by different genetic factors. Some varieties remain free from attacks on the leaves on account of certain growth habits or morphological characteristics, while infection of the tubers may be limited by peculiarities in the structure of the periderm or lenticels. In other cases resistance was apparently of a physiological order, the fungus making slow growth and only fruiting sparsely after infection. The tubers of some varieties, susceptible when young, acquire resistance with advancing maturity. No indication was obtained of any increase in the virulence of *P. infestans* through propagation on the resistant President and Sebago varieties, the reaction of which, and of several seedling types, has remained unchanged over a ten-year period in Aroostook County, contrasted with infection percentages of 20 to 70 per cent. in Green Mountains in the same series of experiments.

MICHEL (W.). **Versuche zur Schaffung einer einfachen Methode für die Prüfung des Verhaltens verschiedener Kartoffelsorten gegen Schorf.** [Attempts at the origination of a simple method for testing the reaction of different Potato varieties to scab.]— *Angew. Bot.*, xxii, 2, pp. 133–146, 1940.

Following up the work of Noll [*R.A.M.*, xix, p. 111] and previous investigators on the factors determining the varietal reaction of potatoes to scab [*Actinomyces scabies*], the writer describes the method employed in a series of tests initiated at the Landsberg (Warthe) Agricultural Experimental Station, Germany, in 1938, and tabulates the results. Thirty-three varieties were included in the trials, 10 more or less resistant and 23 susceptible. The tubers were grown in scab-free soil, and great care was taken to exclude any possibility of injury to the skin which might disturb the normal course of transpiration, this being the criterion applied in the appraisal of the relative resistance or susceptibility of a given variety. Transpiration was determined by the relative loss of weight of single tubers of resistant and susceptible varieties exposed to a current of air, a susceptible tuber being placed on one pan of a balance with a resistant one on the other. The difference in the rates of transpiration was usually evident within an hour, at the end of

which the equilibrium was restored and a further test made. Importance was attached to uniformity in the matters of time of maturity and tuber weight and size, and a minimum of ten tests was reckoned necessary to establish the transpiration relations of one pair of varieties.

Of the first 266 experiments, 242 (91 per cent.) gave positive results, that is to say, the tubers of the resistant varieties (equipped with lenticels occupying a protected site in the skin, provided with suberin deposit and a dense array of complementary cells, and furnished with a relatively small aperture) transpired less freely than those of the susceptible ones in a given combination. Even in 12 comparative tests of two more or less resistant varieties, Ackersegen and Carnea, the former officially designated 'practically immune' and the latter 'somewhat susceptible', the more resistant showed a consistently slighter loss of weight than the semi-susceptible. Similarly, in 15 out of 16 tests (93·7 per cent.) with Robinia and Optima, the former transpired less vigorously and should thus be regarded as the more resistant, an opinion confirmed by field observations. An apparent exception is constituted, however, by the Carnea-Robinia combination, the latter being officially placed in a more resistant category than the former, whereas 7 out of 9 (77·8 per cent.) of the writer's measurements denoted the contrary: according to Schlumberger's latest results, however, Carnea is actually more resistant than hitherto assumed [ibid., xix, p. 564].

There would appear from the outcome of these experiments to be no doubt that intensity of transpiration affords a useful standard for the estimation of varietal reaction to *A. scabies*.

Locke (S. B.). **First report of bacterial ring rot in Arkansas.**—*Plant Dis. Reptr*, xxiv, 12, p. 234, 1940. [Mimeographed.]

Cook (H. T.). **First report of bacterial ring rot in Virginia.**—*Plant Dis. Reptr*, xxiv, 13, p. 252, 1940. [Mimeographed.]

These reports record the occurrence of potato ring rot (*Phytomonas sepedonica*) [*Bacterium sepedonicum*: *R.A.M.*, xix, pp. 428, 725] in Arkansas and Virginia, respectively.

Person (L. H.). **Some new or unusual occurrences of Potato diseases in Louisiana.**—*Plant Dis. Reptr*, xxiv, 13, pp. 252–253, 1940. [Mimeographed.]

Pink rot of potatoes (*Phytophthora erythroseptica*) [*R.A.M.*, xix, p. 235] was observed for the first time in Louisiana in May, 1940, on the Katahdin variety. *P. infestans* was found in the same year for the first time since 1928, the season being probably the most conducive to infection yet experienced. Bacterial ring rot (*Phytomonas sepedonica*) [*Bacterium sepedonicum*: see preceding abstract], first observed in 1939, in Rapides and Livingstone Parishes, was present in 1940 in the entire commercial potato-growing area of the State. The most severe infection, averaging 3 to 5 per cent., occurred on the Triumph variety in Lafourche Parish. The evidence indicated that the disease is not carried over in the soil locally. Bacterial brown rot (*Bact. solanacearum*) [ibid., xix, p. 235] was also observed for the first time.

GLÖCKNER (G.). **Untersuchungen über die 'Sang'-Krankheit der Kartoffeln im Rheingau.** [Investigations on the 'scorch' disease of Potatoes in the Rhine Province.]—*Angew. Bot.*, xxii, 3, pp. 201-252, 11 figs., 2 graphs, 1940.

For some years past the output of the potato crop in the north of the Rhine province has suffered a diminution of varying extent, sometimes involving total loss, as a result of the so-called 'scorch' disease, the development of which regularly coincides with a period of several days of hot, dry weather following a lengthy wet spell. The trouble is most severe on southward-facing, open hillsides and on shallow soils with an admixture of grey slate detritus and a loose, very stony surface. Prominent features of the disorder include inward rolling of the uppermost leaves, progressively extending to the lower ones, yellowing of the entire plant, drooping of the flaccid petioles and shoots, and gradual dying-off of all the foliage, commencing at the outer tips of the pinnate leaves. Diseased plants produce only a few small, flaccid, shrivelled tubers. The microscopic examination, in the early stages of the disease, of a conspicuous sunken, putrescent lesion on the stem base, at or near soil-level, merely reveals a brown discoloration due to heat; this, however, causes the death of the upper cell layers and thereby affords ingress to secondary soil pathogens, e.g., *Verticillium albo-atrum* and probably *Fusarium* spp. and *Botrytis cinerea*, which penetrate the tissues in the form of a wedge, destroying the cell layers down to the xylem. Under conditions of protracted humidity the disorganized cortical layers frequently rupture at the site of injury, and the affected plants are liable to break or split at this point on lifting.

In field trials to determine the effect of various disinfectants, fertilizers, and soil amendments on the incidence of scorch, the susceptible Industrie, Parnassia, and Prisca varieties produced their maximum yields of 225, 208, and 118 kg. per acre, respectively, in plots treated with brassisan [*R.A.M.*, xix, pp. 130, 539] (45 gm. per sq. m.) or uspulun (10 gm.), the former being used for the two first-named and the latter for the third. Another very good soil disinfectant is brassicol [ibid., xix, p. 508] (30 gm. per sq. m.). The varieties Allerfrüheste Gelbe (also susceptible), Ackersegen, Flava, Havilla, Mittelfrühe, and Voran proved more responsive to the application of fertilizers, of which calcium cyanamide (300 kg. per ha.) was particularly beneficial and ammonium sulphate (same rate) also gave good results. In a comparative test on the resistant Ackersegen and Ostbote varieties of the following treatments: strewing the soil with superphosphate, the soil disinfectants P_1 and P_2 [ibid., xix, p. 564] (40 gm. per sq. m.), sprinkling the soil with 0·5 per cent. 1192a or 1 per cent. Bordeaux mixture, and spraying the foliage with the last-named (all at 20 l. per are), the increased yields in the former amounted to 33, 28, 44, 20, 16, and 14 per cent., respectively, over the untreated controls, and in the latter (omitting 1192a) to 16, 2, 38, 15, and 17 per cent., respectively. In addition to the above mentioned susceptible varieties, Altgold and Konsuragis are also regularly affected by scorch and should be replaced locally by one of the more resistant types.

Even when a crop is totally destroyed by the disease, as in 1938, the field should not simply be abandoned without the minimum

precaution of burning all the debris to prevent the propagation of the secondary soil pathogens. Selected seed tends to suffer less than commercial from scorch, no tubers from fields affected by which should be used for planting.

BEELEY (F.). **Annual Report. Pathological Division.**—*Rep. Rubb. Res. Inst. Malaya, 1939*, pp. 156–195, 1940.

In continued investigations by [R.P.N.] Napper on the control of root disease of *Hevea* rubber [*Ganoderma pseudoferreum*, *Fomes lignosus*, and *F. noxius: R.A.M.*, xix, p. 164] it was found that the two problems connected with young replanted areas, namely, (*a*) infections occurring within the boundaries of the old infected patches in the original stand and (*b*) infections occurring outside these boundaries, yield equally well to the standard treatment based on periodic tree-to-tree collar inspection, and need not, therefore, be dealt with separately. In areas where problem (*b*) is severe the treatment should be carefully applied to rubber trees, but it is not necessary to extend inspection to cover crops, except in areas with bush covers of a susceptible type (e.g., *Tephrosia* or *Crotalaria* spp.), where dead bushes should be removed. Collar inspection of bushes is uneconomic. It is particularly stressed that the most satisfactory method of treatment is to dig outwards from the collar of the tree towards the limit of spread of infection, and not towards the tree.

In further replanting experiments the fungal attack was shown to decline gradually after the second and in some cases after the first round of treatment. The incidence of infection on the rubber trees was 30 per cent. higher in areas with a creeping cover than in those with a bush cover. This difference was due to the increased incidence of *F. lignosus*, the total figures for *G. pseudoferreum* being approximately the same in the two types of area and those for *F. noxius* being too small to be significant. On the other hand, the bushes themselves suffer heavily from root disease; thus, in the creeping cover area the 303 infected points treated were all rubber trees, while in the bush cover area of the 824 points treated 230 were rubber trees and 594 bushes. The cost of treatment in the bush cover areas was consistently 50 per cent. higher than in the creeping cover areas.

Tabulated yearly results since the commencement of the replanting experiments [in 1937; loc. cit.] show the cost of six different treatments tested [namely, A, uniform digging to 18 in., both healthy and diseased roots being removed to this depth; B, digging to 10 in., otherwise as A; C, disease patches dug over to a depth sufficient to expose all infected roots, which are removed, and the remainder of the area dug uniformly to 10 in. without collecting the roots; D, disease patches treated as in C, but remainder of the area left undug, apparently healthy trees felled, by jack or grubber and the roots examined; E, no systematic digging, diseased trees dug out individually and infected roots removed, and healthy trees dealt with as in D; and F, no digging or removal of stumps, both healthy and diseased trees cut off at ground-level and the stumps poisoned by injection with sodium arsenite]. Method E, up to the end of the second year, proved to be the most economical treatment in the B.K.1 [inland] experiment. Treatment A

was the most expensive but B, C, and D are gradually catching up with it and F has already caught up with E. In the HI experiment [in a coastal area] a sharp decline in incidence of infection during the second year after planting resulted from treatments A, B, and C, although it continued to be high after C, while D, which is the standard treatment recommended by the Rubber Research Institute for use in both inland and coastal areas, resulted in a constant and low incidence of infection at a very low total cost.

Information obtained from an experimental clearing of virgin jungle for new plantation showed a reduced incidence of root disease during the early years after planting in areas cleared without burning, as compared with those burnt off in the usual way, twice as many infections occurring normally in burnt as in unburnt areas. No satisfactory explanation has yet been found for this fact.

The results of preliminary laboratory experiments carried out by K. P. John showed that on gallic acid medium the three main fungi involved in root disease have highly characteristic reactions.

F. Beeley records the occurrence of bark bursts on the stem and branches of budded rubber trees, appearing in form of small, longitudinal splits of which a dozen or more may be present over a foot of the stem of a four-year-old tree. Long streams of latex exude from these bursts and in time a vigorous callus is formed at the edges of the splits, which rapidly heal over without leaving serious after-effects. No parasitic organism could be detected and the disorder is believed to be entirely of physiological origin.

Mason (E. W.). **Presidential address on specimens, species and names.**—*Trans. Brit. mycol. Soc.*, xxiv, 2, pp. 115–126, 1940.

In the course of this presidential address to the British Mycological Society the author points the distinction between the specimen collected, the real or objective species, and the nomenclatural species to which they are referred. He asserts that the surest basis for the just diagnosis of specimens is the matching of good specimens of the species to be named against good specimens already correctly named, and makes the plea that the 'indoor' specimens derived from culture work should be reserved for other purposes than for naming 'outdoor' fungi.

Bisby (G. R.) & Mason (E. W.). **List of Pyrenomycetes recorded for Britain.**—*Trans. Brit. mycol. Soc.*, xxiv, 2, pp. 127–243, 1940.

This compilation (stated in a note on p. 126 by W. Brown, chairman of the Plant Pathology Committee, to be the first of a projected series of lists of groups of fungi recorded for the British Isles) is preceded by an introductory note briefly tracing the history of British Pyrenomycetes and explaining the authors' system of citation. The list comprises 1,423 entries and many doubtful and superfluous names are necessarily included. Only in the Xylariaceae, Hypocreaceae, and a few other groups are the records arranged to give a close approximation to the species present. The list is followed by two appendices, I Pyrenomycetes recorded from forays, and II Fungi exsiccati published in Britain, a list of 119 references, most of which were consulted in the preparation of the present list, and an index to genera and species.

Pinto (M. C. de R.). **IV Contribuïção para a flora criptogámica do norte de Portugal.** [Contribution IV to the cryptogamic flora of the north of Portugal.]—*Broteria*, ix, 3, pp. 113–128, 1940.

This further contribution to the cryptogamic flora of northern Portugal contains 60 Basidiomycetes in addition to 119 species of fungi first listed in *Bol. Soc. Geogr. Lisboa* in 1887–8. Among the Polyporaceae commonly associated with wood rots may be mentioned *Poria viticola* on vine trunks, *Fistulina hepatica* [*R.A.M.*, xix, p. 245] on cork oak, and *Stereum sanguinolentum* on the decorticated trunks of pine.

Gonçalves da Silva (S.). **Lista preliminar dos doenças das plantas do Estado do Espírito Santo.**] [A preliminary list of the plant diseases of the State of Espírito Santo.] Reprinted from *Bol. Minist. Agric. Rio de J.*, *1939*, 12 pp., 1940.

This is a list of the plant diseases observed in the State of Espírito Santo, Brazil, during 1937–8 [*R.A.M.*, xix, p. 520].

Park (M.), Paul (W. R. C.), & Fernando (M.). **Some studies on Tobacco diseases in Ceylon.—VI. The effect of priming and of the application of fungicides on the control of frog-eye in the field.** *Trop. Agriculturist*, xcv, 1, pp. 8–15, 1940.

In further studies on the control of frog-eye of tobacco [*Cercospora nicotianae*: *R.A.M.*, xvii, p. 775; xix, p. 121], plots of Harrison's Special, primed and unprimed, were either sprayed with a proprietary colloidal copper fungicide [unspecified] containing 22 per cent. copper oxychloride plus a spreader (both as used in the previous experiments of this series), or dusted with a copper-lime dust containing a mixture of monohydrated copper sulphate and calcium hydroxide. The results showed that spraying was considerably superior to dusting, but the latter produced, nevertheless, a large and significant increase in yields over the control; thus, the yield of clean cured leaf was 402·4, 289·2, and 182·3 lb. per acre in sprayed, dusted, and untreated plots, respectively. Priming was shown to reduce the severity of the disease, the yields of the primed and unprimed plots being 343·7 and 238·9 lb. per acre, respectively. No estimate of costs of large-scale dusting was attempted, but it is suggested, on the basis of results obtained in previous studies, that a combination of a pre-optimum and a post-optimum dusting may provide more economic control of frog-eye than a single optimum spraying.

Valleau (W. D.) & Johnson (E. M.). **Tobacco diseases in Kentucky.** —*Plant Dis. Reptr*, xxiv, 12, pp. 236–238, 1940. [Mimeographed.]

During 1940, the epidemic of tobacco wildfire (*Phytomonas tabaci*) [*Bacterium tabacum*] and angular leaf spot (*P. angulata*) [*Bact. angulatum*: *R.A.M.*, xix, p. 678] that occurred in Kentucky between the south-central area of the state and the Ohio River was the most severe on record for this locality. Angular leaf spot was present almost everywhere, and wildfire was found in localities where it had never previously been observed. Of 223 beds treated with Bordeaux mixture none showed either disease, except for three plants where water washed across one bed, though of 466 untreated beds, 50 showed wildfire, 128 angular leaf spot, and 58 both diseases. Blue mould (*Peronospora tabacina*)

[ibid., xix, p. 733] was noted in 20 and 86 of the treated and untreated beds, respectively. Wildfire was more destructive than angular leaf spot, many plants affected with the former being killed or so dwarfed that they failed to set. The available evidence indicates that blue mould is unlikely to cause serious trouble in Kentucky except in those years when early and extensive infection develops in Georgia and the Carolinas. The only recommendation made at present is to use new bed sites every year, in places where they receive a maximum of sunlight.

GODFREY (G. H.). **Tomato curly top and other noteworthy plant diseases in the Lower Rio Grande Valley.**—*Plant Dis. Reptr*, xxiv, 13, pp. 255–256, 1940. [Mimeographed.]

During 1940, tomatoes growing in the Lower Rio Grande Valley, Texas, were affected for the first time (to any commercially important extent) by yellows or [beet] curly top [*R.A.M.*, xix, p. 440]. On 13th May, 15 per cent. of the plants in one section of a 150-acre tomato field lying to the north-west of Mission were found to be affected and entirely non-productive. A few individuals of *Eutettix tenella* were collected in the vicinity.

Phymatotrichum omnivorum [cf. ibid., xviii, p. 76] was present in portions of large carrot and root parsley fields near Mission; in irregular patches comprising about 50 per cent. of the area affected it was completely destructive.

SHAPOVALOV (M.) & LESLEY (J. M.). **Wilt resistance of the Riverside variety of Tomato to both Fusarium and Verticillium wilts.**—*Phytopathology*, xxx, 9, pp. 760–768, 1 fig., 1940.

This is an expanded account of the writers' experimental observations in California from 1930 to 1938 on the resistance of the Riverside tomato variety to *Fusarium* [*bulbigenum* var.] *lycopersici* and *Verticillium albo-atrum*, a preliminary note on which, covering the results up to 1937, has already been published [*R.A.M.*, xvii, p. 139]. The outcome of the 1938 tests confirmed that of previous trials, Riverside producing only 3·8 per cent. plants with infection of such severity as to destroy the stems and seriously reduce the yield, the corresponding figures for Marglobe, Stone, and the fairly resistant Pearson being 55·8, 64·1, and 6·2, respectively.

STANLEY (W. M.). **Purification of Tomato bushy stunt virus by differential centrifugation.**—*J. biol. Chem.*, cxxxv, 2, pp. 437–454, 2 figs., 1 graph, 1940.

At the Rockefeller Institute for Medical Research, purified preparations of the tomato bushy stunt virus [*R.A.M.*, xviii, pp. 143, 353] were obtained by differential centrifugation of the juices from frozen and unfrozen tomato, *Datura stramonium*, and *Solanum nodiflorum* plants infected by the disease. There was no indication of impairment in the activity of the virus, judged by the results of inoculations on half leaves of *Nicotiana glutinosa*, by freezing and thawing of the test material. The yield of virus from *D. stramonium* exceeded that from tomato or *S. nodiflorum* four or five times. Purified preparations were also obtained from the juices of tomato and *D. stramonium* by Bawden and Pirie's

chemical method. Although many of the properties of such preparations were apparently indistinguishable from those obtained by differential centrifugation, the specific virus activity of the chemically treated samples was definitely lower, evidently from the exposure to a temperature of 60° C. rather than as a result of precipitation with ammonium sulphate.

Nucleic acid of the ribose type was isolated from a preparation of bushy stunt purified by differential centrifugation. The virus appears to be a nucleoprotein containing about 17 per cent. nucleic acid, with an ultra-violet light absorption maximum at 2,650 Å, a sedimentation constant of $S20_w = 132 \times 10^{-13}$ (which is significantly lower than the value of $S20_w = 146 \times 10^{-13}$ reported by McFarlane and Kekwick [ibid., xviii, p. 143]), and a diffusion constant of $D20 = 1{\cdot}15 \times 10^{-7}$. Purified preparations, however obtained, assume the form of rhombic dodecahedric crystals with edges as great as 0·1 mm. Since the partially inactivated preparations obtained by the chemical method yield crystals similar to those of the fully active virus, crystallinity cannot be used as a criterion of purity in respect of virus activity.

Neurath (H.) & Cooper (G. R.). **The diffusion constant of Tomato bushy stunt virus.**—*J. biol. Chem.*, cxxxv, 2, pp. 455–462, 1940.

From the diffusion and the sedimentation constants of bushy stunt virus [see preceding abstract] a molecular weight of 10,600,000 [*R.A.M.*, xviii, p. 353] and a dissymmetry constant of $fD/f_0 = 1{\cdot}27$ were calculated. Assuming negligible hydration, this would correspond to a molecular axial ratio of 5·4 : 1 and 5·8 : 1 for prolate and oblate ellipsoids of revolution, respectively. About 77 per cent. hydration would have to be assumed in order to account for the value of the dissymmetry constant on the assumption of spherical shape.

Saiyananda (C.) & Celino (M. S.). **Leaf blight of Tomato.**—*Philipp. Agric.*, xxix, 4, pp. 365–377, 4 figs., 1940.

Helminthosporium lycopersici Roldan has been observed in recent (1939 to 1940) experimental studies at the Los Baños College of Agriculture, Laguna, Philippines, to attack tomato [*R.A.M.*, xvi, p. 209] plants at an early stage, inducing premature defoliation, failure to set fruit, and sometimes death, by the formation on the leaves of light to greyish-brown, coalescent, roughly circular lesions, on both surfaces of which are produced, singly or in clusters, simple, thick-walled, septate, erect or flexuous, light brown conidiophores, 45·9 to 105·4 by 5·1 to 6·8 (average 75·7 by 5·9) μ, bearing at their tips light brown, fusoid to cylindrical, clavate to obclavate, continuous to 8-septate conidia, 20·4 to 78·2 by 5·1 to 11·9 (49·3 by 8·5) μ. The cultural characters of the fungus on a number of standard media are described: on potato dextrose agar (the best) the colonies gradually turn from gull-grey through olive and dark olive-grey to mouse-grey, conidia being readily produced. Within the P_H limits tested (3·8 to 8·4) the growth rate of the organism increased parallel with the steps in the transition from the acid to the alkaline side.

Inoculation experiments with *H. lycopersici* on tomato seedling leaves (by atomizing with spore suspensions or smearing with mycelium and

spores from potato dextrose agar) resulted in the development of typical blight symptoms, and the fungus was re-isolated from the infected tissues. Eggplant and pepper reacted to inoculation by mild foliar symptoms showing no tendency to spread. Wind and water are believed to constitute the natural means of dissemination in the field. The examination of stained inoculated leaf sections revealed the stomata as the usual channels of hyphal penetration, though occasional entry directly through the epidermis was observed. The conidia of *H. lycopersici* being able to retain their viability on tomato leaves for six months under dry conditions, the persistence of the disease from one season to the next is readily explained. Infection (both natural and artificial) was found to be much more severe on introduced American than on home-grown varieties, Marglobe, Dwarf Giant, Matchless, True Giant Ponderosa, and Sunnybrook Earliana all being destructively attacked in inoculation experiments, besides one native tomato. Control should be based on stringent field sanitation.

Kelsheimer (E. G.) & May (C.). **Verticillium wilt of Elm.**—*Plant Dis. Reptr*, xxiv, 14, pp. 282–284, 1940. [Mimeographed.]

Since 1933 a species of *Verticillium* [*R.A.M.*, xviii, pp. 67, 281] forming applanate to slightly pulvinate, greyish-green to black colonies and consistently producing pseudo-sclerotia has been isolated from American and English elms in 33 States of the American Union, extending from Oregon eastwards to Maine and from Minnesota southwards to Louisiana; *Ulmus fulva* may also be affected. Young trees are the most liable to infection, though older ones with a breast-high diameter of 48 in. are attacked too. The disease cannot be identified by symptoms alone. On 2 per cent. potato sucrose agar with a P_H of 5·5 to 6·4 at 26° C. the fungus may develop in four days, though a period of 14 to 21 days is sometimes requisite.

Miller (P. W.), Bollen (W. B.), Simmons (J. E.), Gross (H. N.), & Barss (H. P.). **The pathogen of Filbert bacteriosis compared with Phytomonas juglandis, the cause of Walnut blight.** *Phytopathology*, xxx, 9, pp. 713–733, 5 figs., 1940.

A comparative study was made of the morphological, cultural, biochemical, and pathological characters of a number of isolates of the filbert (*Corylus avellana* and *C. maxima*) blight pathogen prevalent in the Pacific North-West [*R.A.M.*, xix, p. 309] and various strains of *Phytomonas* [*Bacterium*] *juglandis*, the agent of walnut blight [ibid., xix, p. 373]. The two organisms showed no fundamental differences in morphological, biochemical or cultural characters, or staining reactions, while such variations as were observed in the assimilation rate of certain carbon sources could not be utilized for diagnostic purposes owing to their distribution among all the isolates of both pathogens. Similar but less marked variations in the rate of nitrogen consumption were also detected among the different isolates. On the other hand, the results of preliminary cross-agglutination tests on rabbits indicate the possibility of the serological separation of the two bacteria, while definite evidence of differences in pathogenicity was obtained in cross-inoculation tests in the field, all the walnut isolates being virtually innocuous to

filbert branches, and all the filbert strains non-injurious to walnut stems of current growth. On the basis of these pathological and serological differences the filbert pathogen is named *P. corylina* n.sp. The organism is a capsulate rod, 1·1 to 3·8 by 0·5 to 0·7 μ, motile by one polar flagellum, Gram-negative, non-acid-fast, staining readily with gentian violet and carbol fuchsin; forming abundant, glistening, pale lemon- to coppery-yellow colonies on dextrose agar at 22° C.; slowly liquefying gelatine and peptonizing milk, hydrolysing starch, producing ammonia in peptone-containing broth, aerobic, not reducing nitrates to nitrites or forming gas, indol, or hydrogen sulphide; at 28° evolving acid from dextrose, levulose, galactose, lactose, sucrose, maltose, xylose, raffinose, mannitol, glycerol, and starch, and alkali from citrate, lactate, malate, and succinate, and utilizing (in order of availability) peptone, aspartic acid, alamine, leucine, sodium ammonium phosphate, allantoin, tyrosine, uric acid, and brucine; with a growth range from 5° or 7° to 37°, optimum 28° to 32°, thermal death point 53° to 55°, and a P_H range from 5·2 to 10·5, optimum 6 to 8.

Ludbrook (W. V.) & White (N. H.). **Observations and experiments on Diplodia die-back of Pines at Canberra, A.C.T.**—*J. Coun. sci. industr. Res. Aust.*, xiii, 3, pp. 191–194, 1940.

Observations at Canberra during the past six seasons have shown the presence of *Diplodia pinea* [*R.A.M.*, xviii, p. 656] in association with die-back of pine trees. In one group of *Pinus ponderosa*, single shoots showed the condition each season, but the fungus generally failed to spread beyond the first or second node below the point of infection, and the general growth of the trees was not seriously affected. *D. pinea* possibly hastened the death of other trees within a mile of the Australian Forestry School exposed to drought but is not thought to have been the primary cause of their loss; while in a third locality the fungus may have functioned as an active pathogen. On 99 wound inoculations with *D. pinea* on 6 species of *Pinus*, 37 gave positive results, as also did 2 out of 15 inoculations on unwounded *P. radiata*. In all except 6 of the successful inoculations, the die-back appeared to be checked at the first or second internode below the inoculation site; the exceptions were all inoculations on weak lower laterals. These results indicate that under the conditions prevailing locally, *D. pinea* is not likely to cause serious injury to the hosts studied in the absence of factors predisposing to infection. *D. pinea* is ubiquitous as a saprophyte on debris in pine forests and is undoubtedly capable of actively parasitizing limited portions of vigorous trees, but such trees are normally able to resist its advance and confine the damage to insignificant proportions. One isolate of *D. pinea*, resembling *D. natalensis* [ibid., xvi, p. 219] in forming pycnidia more freely than normal in culture but differing in the absence of striations on the spores, was distinctly more pathogenic to lemons than the typical *D. pinea* and is regarded as a variant of that species.

Ludbrook (W. V.). **Boron deficiency symptoms on Pine seedlings in water culture.**—*J. Coun. sci. industr. Res. Aust.*, xiii, 3, pp. 186–190, 1940.

Continuing his investigations into needle fusion in *Pinus* spp. in New South Wales [*R.A.M.*, xviii, p. 491], the author carried out experi-

ments [which are described] in which young *P. radiata* and *P. taeda* plants were grown in nutrient solutions with and without adequate supplies of boron [ibid., xix, p. 682]. Most of the plants lacking in boron showed a reduced growth rate, followed by cessation of apical growth, and the development of necrotic symptoms at the growing points of the tips and roots. The cessation of apical growth was accompanied by swelling of the stem apex, death of young needles adjacent to the apical bud, and resin exudation from the bud. The juvenile needles were shortened and bluish-green, while the mature needles were slow in appearing, few, and short. In some of the boron-deficient plants, the fasciculate needles showed a tendency to fusion.

These results are considered to demonstrate that boron is essential for the normal growth of the plants concerned in water culture, but it is not claimed that needle fusion symptoms, as they occur in pine plantations, are due to boron deficiency. It may be that 'fusion' of the needles is produced by more than one cause. Mycorrhizal development, dependent as it is on active root growth, may possibly be affected by boron deficiency in plantation soils.

Bowen (P. R.). **Cenangium abietis, Brunchorstia destruens, and Crumenula abietina.**—*Proc. Pa Acad. Sci.*, xiv, pp. 95-99, 1940.

All the writer's attempts to induce fruiting in cultures of *Cenangium abietis* [*R.A.M.*, xviii, p. 490] and *Brunchorstia destruens* failed, and in crosses between the two species on various media the phenomenon of aversion was very noticeable. Inoculation experiments on *Pinus sylvestris*, *P. strobus*, and *P. resinosa* also gave negative results as regards spread and fruiting of the fungi. The apothecia of *Crumenula abietina*, received from Jørgensen on *P. sylvestris* twigs from Denmark, gave rise to a mycelium similar to that of *B. destruens* (of a definite green, composed of long, flocculent hyphae, the old mycelium in contact with the upper surface of the agar being massed into a blackish-green sclerotial layer). Inoculations into twigs of the three above-mentioned trees resulted in the development of pycnidia containing the typical conidia of *B. destruens*.

It is concluded from these observations that neither *Cenangium abietis* nor *B. destruens* (which are distinct species) is parasitic on young pines in the United States, and that *B. destruens* is the imperfect stage of *Crumenula abietina* [ibid., xii, p. 667].

Milbrath (J. A.). **A Phytophthora disease of Chamaecyparis.**—Abs. in *Phytopathology*, xxx, 9, p. 788, 1940.

A destructive root and crown rot is stated to be causing heavy losses in ornamental plantings of *Chamaecyparis* [? in Oregon]. The death of the roots is followed by a uniform reddish-brown discoloration of the foliage. A sharp line of demarcation between the dead and living crown tissue may be observed beneath the outer layer of the bark at soil-level. An apparently new species of *Phytophthora*, for which C. M. Tucker suggests the name *P. lateralis* [without diagnosis], was isolated from a number of diseased trees and inoculated into healthy ones, resulting in their death after two to six months. The original organism was successfully reisolated.

Hopkins (J. C. F.). **Diseases of fruit, flowers, and vegetables in S. Rhodesia. 2. Black rot disease of Cabbages and Cauliflowers.**—*Rhod. agric. J.*, xxxvii, 9, pp. 508–511, 1 fig., 1940.

In Southern Rhodesia, cabbages and cauliflowers are commonly affected by black rot (*Bacterium campestre*) [*Pseudomonas campestris*: *R.A.M.*, xviii, pp. 234, 565] during the rainy season, while the disease has also been reported locally on turnips. During 1940, many cases of severe infection of cauliflowers were reported from all parts of the Colony in April, May, and June, the outbreak perhaps being induced by exceptionally heavy late rains. Even at the end of June, serious infection of cabbage seedlings was present, and many cauliflowers were found to be stunted. Control measures would appear to be required at all periods of the year. Much of the seed sold locally appears to carry the pathogen externally, and all seed should be disinfected by the hot water treatment [ibid., xix, p. 250] or the use of mercury compounds. Crop rotation is also necessary, and all plant debris from diseased crops should be destroyed. Where cabbages or cauliflowers are grown on a large scale the seed-beds should be sterilized by the open-fire method before sowing. The young plants should be sprayed three or four times with Bordeaux mixture (4–4–50) plus lead arsenate (1½ lb. per 50 gals.) and a good spreader. This practice has proved very beneficial locally.

Gonçalves [da] Silva (S.). **A ferrugem branca das cruciferas.** [White rust of crucifers.]—*Biologico*, vi, 8, pp. 225–226, 1940.

This is a popular note on white rust (*Albugo candida*) [*Cystopus candidus*] of crucifers, of which only radish [*R.A.M.*, xviii, pp. 228, 471] is affected to any appreciable extent in Brazil. Spraying with 1 per cent. Bordeaux mixture in the seed-bed and field is recommended in addition to routine sanitary measures.

Gaskill (J. O.) & Kreutzer (W. A.). **Verticillium wilt of the Sugar Beet.**—*Phytopathology*, xxx, 9, pp. 769–774, 3 figs., 1940.

A species of *Verticillium* with morphological and cultural characters closely resembling those of *V. albo-atrum* was isolated in August, 1939, from the necrotic vascular tissues of the tap-roots of sugar-beets in Colorado, where seven fields in three districts were affected with a maximum incidence of 1 per cent. The first external symptoms of infection were the wilting and dying of the outer foliage, following which the inner leaves developed a narrow, pointed habit, turning yellow and becoming slightly flaccid, with the petioles twisting away from their normal positions and the leaf blades showing a revolute curling of the margins. The diseased roots were only 7·9 per cent. lower in weight than the healthy controls, but there was a highly significant reduction of 27·5 per cent. in the sucrose content of the former.

Murphy (D. M.). **A Great Northern Bean resistant to curly-top and common Bean-mosaic viruses.**—*Phytopathology*, xxx, 9, pp. 779–784, 1 fig., 1940.

The Great Northern U.I. 15 hybrid bean [*Phaseolus vulgaris*], a selection from the Red Mexican material which has already provided

Idaho growers with the mosaic- and curly top-resistant U.I. 3 and U.I. 34 lines [*R.A.M.*, xvii, p. 646], has given highly satisfactory results in experimental plots from 1937 to 1939, inclusive, its average yield for the period under review being 26·7 lb. per 50 ft. of 4 rows, compared with 19·1, 20, and 17·9 for U.I. 123, 81, and 59, respectively, and its incidence of curly top nil as against 22, 21·6, and 29·6 per cent., respectively, for the three other test strains. The selection has further maintained a continuous freedom from mosaic.

Dana (B. F.). **Resistance and susceptibility to curly top in varieties of common Bean, Phaseolus vulgaris.**—Abs. in *Phytopathology*, xxx, 9, p. 786, 1940.

Extensive field trials are stated to have revealed extreme susceptibility to curly top among varieties of wax-pod snap beans (*Phaseolus vulgaris*), moderate to extreme susceptibility in green-pods, and reactions ranging from extreme susceptibility to strong resistance or immunity among field or dry beans, the only representatives of the last-named category being California Pink, California Red, Red Mexican, Burtner, and Jenkins or Idaho Cream. The disease is liable to kill seedlings of susceptible varieties, while older plants gradually turn yellow and die. In both seedlings and older plants the growing points are usually destroyed at an early stage and may fall away. Plants continuing to develop after infection are dwarfed, with shortened internodes and abnormally small, profusely curled leaves. Progeny selections in the F_4 of crosses between Blue Lake and Burtner and reciprocals manifested a high degree of resistance to curly top combined with excellent quality.

Dundas (B.). **A preliminary report on the inheritance of resistance to rust (Uromyces appendiculatus) in Beans (Phaseolus vulgaris).**—Abs. in *Phytopathology*, xxx, 9, p. 786, 1940.

The inheritance of resistance to four physiologic races of bean (*Phaseolus vulgaris*) rust (*Uromyces appendiculatus*), namely, Harter's 1 and 2 and two isolated from Florida and Washington material and tentatively identified by Harter as his strains 10 and 4 [*R.A.M.*, xix, p. 59], was studied by inoculating detached leaflets of plants from F_2 populations floated upside down on a 5 per cent. sucrose solution in Petri dishes. Tests on F_2 plants of the cross between Brown Kentucky Wonder 36928 (resistant) and Pinto (susceptible) indicated that the former carries three main independent dominant factors for resistance, A, B, and C, of which the first-named confers resistance to races 1, 2, or 10, the second to 1 and 2, and the third to 10. Similarly, observations on the progeny of the two resistant varieties, 36928 and Golden Gate Wax showed that the latter contains a single dominant factor for resistance to races 1, 4, and 10, differing from the three factors in 36928 and designated D. Further data indicate that other factors for resistance occur in other varieties.

Dundas (B.). **A new factor for resistance to powdery mildew (Erysiphe polygoni) in Beans (Phaseolus vulgaris)** Abs. in *Phytopathology*, xxx, 1, p. 786, 1940.

A single dominant factor for resistance to powdery mildew (*Erysiphe*

polygoni), previously detected in Pinto and other field beans (*Phaseolus vulgaris*) [*R.A.M.*, xix, p. 60], has now been found to occur also in a strain of the Kentucky Wonder snap variety. A number of varieties contracting only slight infection in the field, but showing greater susceptibility in dish tests, do not contain the Pinto factor and may be classed as semi-resistant, their reaction varying from year to year and depending partly on the strains of the fungus present. Of 126 F_2 seedlings derived from a cross between the semi-resistant Long Roman and the susceptible Red Kidney, inoculated in the field with strain 1 [ibid., xii, p. 207] of *E. polygoni*, 94 manifested the Long Roman character for semi-resistance and 32 were susceptible, the 3 : 1 ratio indicating that the resistance in Long Roman is due to a main dominant factor. F_3 families from susceptible F_2 plants produced only susceptible populations. Of the F_3 families from semi-resistant F_2 plants, 29 were homozygous semi-resistant and 52 segregated in a ratio of 3 semi-resistant : 1 susceptible, thereby confirming the results of the F_2 tests.

Kreutzer (W. A.), Durrell (L. W.), & Bodine (E. W.). **Pathogenicity and sexual phenomena exhibited by Phytophthora capsici.**—*J. Colo.-Wyo. Acad. Sci.*, ii, 6, p. 35, 1940. [Abs. in *Biol. Abstr.*, xiv, 7, p. 1208, 1940.]

Phytophthora capsici is stated to cause a blight of [chilli] pepper, a rot of tomato and cucumber fruits, and a wilt of squash and watermelon vines in the field in Colorado [*R.A.M.*, xix, pp. 254, 328]. The pairing of isolates from cucumber fruits with those from chilli stems in plates of nutrient media led to the linear formation of oospores at the junction of the colonies.

Du Plessis (S. J.). **Bacterial blight of Vines (vlamsiekte) in South Africa caused by Erwinia vitivora (Bacc.) Du P.**—*Sci. Bull. Dep. Agric. S. Afr.* 214, 105 pp., 14 pl., 1 fig., 1 graph, 1 map, 1940.

Bacterial blight of vines [*R.A.M.*, xviii, p. 498] was found to occur in 1936 in one region of the Worcester district of the Western Cape Province, South Africa, and was later observed in numerous vineyards of several other districts. There are indications that the blight had been originally introduced from overseas, probably not later than in 1926. Susceptible varieties like Sultana, Caanan, Henab Turki, and Red Hanepoot were so seriously affected by the disease that they totally failed to crop.

The disease is rarely observed in nurseries, although the stocks may carry internal infection. Symptoms usually appear five years after grafting and exhibit great variation, the chief being a pale, later black, discoloration of the lower two or three nodes extending upwards along the young shoots into the petioles and downwards into the stem and even some of the roots. Sometimes the discoloration is not continuous but broken into longitudinal areas. The underlying tissues disintegrate and the stem ultimately splits open. Cankerous lesions may develop, especially at the nodes. In heavily infected vineyards die-back of the shoots can frequently be observed, as well as the formation of a large number of adventitious buds which usually die off before they have had an opportunity of developing. Soon after the symptoms appear on the

shoots the leaves begin to turn yellow and subsequently bright brown, irregular discoloured portions being killed. Primary leaf spots are yellow at first, turning a bright reddish-brown later, up to about 7 mm. in diameter, irregularly or angularly circular, and glossy from a thin film of bacterial exudate. The stalks of the bunches in the pre-blossom period tend to be rigid, erect, thickened, and long, and bear fewer blossoms, which are small and often fail to be fertilized. More mature bunches become partly blackened and show small cankerous lesions, while the stalks are liable to drop with their crop. Berries affected in the earlier stages gradually wither and become mummified, mostly on the discoloured areas of the older parts of the exuded vines. A comparison of these symptoms with those described for 'mal nero', 'gommose bacillaire', 'gelivure', 'maladie d'Oléron', and others lead to the conclusion that all these diseases are similar to the South African blight.

A bacterium was isolated from affected material and its pathogenicity proved by inoculation experiments, although infection of the shoots was obtained only when they were severely injured and before lignification had advanced too far. It appeared that only leaves are liable to be infected in the uninjured state, the bacterium penetrating presumably through the stomata. Injuries conducive to infection are caused in vineyards by winds and through cultural practices. An examination of stained diseased tissue showed that the bacterium invades the young shoots from older infected main portions usually through the xylem, causing a browning of the walls and the formation of gum in these and neighbouring cells. Tyloses are frequently formed in the invaded xylem. The walls of the xylary ducts appeared to be extremely resistant to disintegration by the bacterium and yield only to subsequent fungal invasion. From the primary xylem of young shoots the organism passes into the xylem parenchyma, the cells of which become very enlarged and develop abnormally thin walls. The bacterium may further invade the cells of the medullary rays, which begin to collect gum and soon disintegrate. No gum has been observed in the cells of invaded cambium, which rapidly lose their shape and break up. In the phloem the organism attacks the phloem parenchyma, which may be either destroyed or the cells induced to enlarge abnormally before their ultimate destruction. The bacterium apparently thrives best in the tissues of the cortex and epidermis, where it also does the most damage; the cell walls collapse, and the intercellular cavities become filled with a dense mass of bacteria and sometimes gum. The disorganization and dislocation of the inner tissues due to hypertrophy is, however, not noticeable superficially, apparently owing to the rapid destruction of the cortical tissues. The bacterium further invades mature grape berries through the xylem and penetrates into the pulp cells. *Botryosphaeria vitis* was often found associated with the advanced stages of the disease, but is considered to be a secondary invader.

The causal bacterium is identified with *Bacillus vitivorus* Bacc. and is renamed *Erwinia vitivora* n. comb. It is described as short, rod-shaped, with rounded ends, 0·95 to 2·2 by 0·4 to 1·1 μ (average 1·5 by 0·7 μ), occurring singly, in pairs, chains or packs, motile, with as many as eight perithrichous flagella, 20 μ long, capsulated, Gram-negative, non-acid fast, without involution forms, and facultatively anaerobic.

Young colonies on agar are punctiform or lenticular, ultimately circular, raised to pulvinate, and glistening; older cultures are light to orange-yellow, and smooth to rugose. Growth was most profuse on potato dextrose agar, fair on nutrient agar, and poor on synthetic agars. In liquid media the surface growth is flimsy, flocculent to granular, or rugose. The bacterium liquefies gelatine fairly slowly, causes milk to curdle with acid production, reduces nitrates, hydrolyses starch with the production of acid, produces hydrogen sulphide from peptone, apparently cleaves xylose, glucose, fructose, sucrose, lactose, mannitol, and salicin, with the production of acid, but cannot split raffinose or inulin. It grows best at P_H 6·0 and fairly well at P_H 7·7, but not at P_H values below 4·2; its optimum temperature for growth is between 25° and 30° C., and it is unable to grow at 0° and 40°.

The different varieties of *Vitis vinifera* tested appeared to vary greatly in their susceptibility to the disease and are accordingly grouped in four groups, Almeria, Canon Hall, Malbec, Mataro, Muscat Hamburg, Pedro, and White Madeline being apparently resistant. The development of the disease appears to be favoured by excessive soil moisture and high contents of nitrogen and probably phosphates, and by high atmospheric humidity, especially when combined with high rainfall at temperatures between 20° and 25°. The organism is capable of overwintering mainly in the host tissues, being thus the primary source of infection of young shoots. It is disseminated by wind, water, and by contact through tools and the like. Experiments on the control of the disease during 1936 and 1937 failed to show any consistent positive results with any of the sprays or dusts tested, but the application of 10 per cent. copper sulphate solution in the autumn may be of some value on vines little affected by the disease. The general recommendations for control include the selection of sound material for scions and root stocks, periodical inspection of vineyards, pruning of infected vines immediately after leaf fall in the autumn, treating all wounds with a Bordeaux paste or coal tar after pruning, elimination or restriction of topping and trimming, spraying lightly affected vines with 10 per cent. copper sulphate in the autumn, uprooting of affected vines in vineyards where only a few vines have become infected, the destruction of all infected material, and the selection of resistant varieties and root-stocks.

WALTERS (D. V.) & LUDBROOK (W. V.). **'Dying Vines' in the Murray Valley.**—*J. Coun. sci. industr. Res. Aust.*, xiii, 3, pp. 183–186, 1940.

For more than twenty years the irrigated vineyards of the Murray Valley have shown the presence of a condition known locally as 'dying vines', while the trouble has also been reported from the vicinity of Adelaide. Affected vines fail to make new growth in spring, and begin to die during the dormant period. Water-shoots may sprout from the base, but the new vine generally succumbs within a year or so. Occasionally, weak shoots develop in spring from the previous season's wood, but the foliage wilts towards the end of January before the fruit ripens, the vine subsequently dying. The losses incurred range from two to five vines per 20-acre holding each year, though on one occasion

30 vines died in one season in a 4-acre patch. In 1938, only about 100 affected vines were brought to the author's attention in 40,000 acres.

The dying vines appear to occur at random among healthy ones, but in some cases the evidence suggests that the condition is associated with waterlogging or salinity. Vines under eight years of age are generally unaffected.

Laboratory examination of affected vines showed, on splitting each vine longitudinally, a brown, hard, dry zone at or near ground-level, which appeared to have spread from mechanical injuries due to tillage. The affected wood had a characteristic sour odour, and 30 per cent. of 730 pieces when plated gave an unidentified imperfect fungus with scanty, yellowish-brown mycelium, and abundant straight, cylindrical, hyaline, 1- to 3-septate conidia. This fungus was obtained from 12 out of 14 vines examined.

Inoculations made with this fungus through wounds in the stems of 2- to 17-year-old vines in three localities resulted in discoloration of the wood of some of the vines; some of the controls showed a similar discoloration. As all the inoculated vines produced two seasons' healthy growth, it is concluded that the fungus is, at most, weakly pathogenic. The condition is probably physiological, though slow invasion of the wood through tillage injuries by weak parasites may be a contributory factor.

THOMPSON (A.). **Legislation in Malaya relating to trade in plants.**—*Malay. agric. J.*, xxviii, 9, pp. 408–413, 1940.

In this paper the author briefly summarizes the more important legislation in force at present in Malaya to control the import and export of plants [cf. *R.A.M.*, xvi, pp. 144, 848, *et passim*].

Gold Coast. Regulations made under the Plant Pests and Diseases Ordinance.—1 p., 1940.

The Plant Pests and Diseases (Swollen Shoot) Regulations, No. 44 of 1940, dated 16th July, 1940, prohibit the transport from the Eastern Province of any cacao plant or part thereof except dried fermented beans, unless under special permit from the Director of Agriculture [in order to prevent the spread of 'swollen shoot' *R.A.M.*, xvii, p. 224].

No. F. 43–15/40–A. Government of India. Department of Education, Health and Lands. Notification (Agriculture).—1 p., 1940.

Notification No. F 43–15/40–A., of 14th August, 1940, prescribes the following further amendment in the previous Notification No. F. 320/35–A of 20th July, 1936 [enforcing certification of citrus plants against *Deuterophoma tracheiphila*: *R.A.M.*, xvi, p. 496], viz., the insertion in paragraph 8, after the words 'British India', of the words 'except from Burma' [see next abstract].

Burma Department of Agriculture and Forests. Agricultural Branch. Notifications Nos. 29 of 1937, 376 of 1939, and 75 of 1940.—5 pp., 1940.

Notification No. 29 of 2nd November, 1937, superseding that of the

Department of Education, Health and Lands of the Government of India, No. F 320/35-A of 20th July, 1936 [*R.A.M.*, xvi, p. 496] makes the following provisions, *inter alia*, designed to prevent the introduction of plant diseases into Burma. No plant, except sugar-cane for planting in quarantine under the personal supervision of the Deputy-Director of Agriculture, East Central Circle, Pyinmana, shall be imported into the country by letter or sample post, the same exception being made to the restrictions on the importation of plants by air.

Only fruits and vegetables intended for consumption may be imported by sea without a duly authenticated certificate of freedom from pests and diseases. Potatoes imported by sea or air (except from India) must be accompanied by (1) a certificate from the consignor giving full particulars of the locality of cultivation and vouching for the absence therefrom of wart disease [*Synchytrium endobioticum*], and (2) an official certificate stating that, during the 12 months prior to the date of issue, no case of the disease has been recorded within five miles of the place of cultivation.

Hevea rubber plants destined for Burma must be officially pronounced free from infection by *Fomes semitostus* [*F. lignosus*], *Sphaerostilbe repens*, *Fusicladium macrosporium* [*Dothidella ulei*], and *Oidium heveae*. No rubber plants or seeds may be imported from America or the West Indies except by the Director of Agriculture.

Freedom from mal secco (*Deuterophoma tracheiphila*) is required in the case of lemon, lime, orange, grapefruit, or other citrus plants and cuttings.

The importation of sugar-cane by sea from Fiji, New Guinea, Australia, or the Philippines is prohibited absolutely: consignments from other countries must be accompanied by certificates stating that they are exempt from all forms of root rot, pineapple disease (*Thielaviopsis* [*Ceratostomella*] *paradoxa*), sereh disease, leaf scald [*Bacterium albilineans*], and gummosis [*Bact. vasculorum*], originated from a crop free from mosaic and streak, and that Fiji disease is absent from the country of export. Any plants grown in quarantine under the conditions referred to above, manifesting within the minimum statutory period of one year symptoms of a pest or disease not hitherto recorded in Burma, will be destroyed by fire.

Flax, Egyptian clover [*Trifolium alexandrinum*], and cotton seed may be imported only under a licence from the Director of Agriculture, and by sea. The importation of cotton seed is restricted to quantities not exceeding 1 cwt. for any one consignment for experimental purposes only, to enter exclusively through the port of Rangoon and to be subject on arrival to fumigation with carbon bisulphide. Unginned cotton may not be imported either by sea or air.

Coffee plants, seeds, and beans may also be imported solely for experimental purposes by the Director of Agriculture, except that roasted and ground coffee or consignments of unroasted or unground coffee beans or seeds produced in India may be imported if accompanied by a properly authenticated certificate.

The importation of *Sebastiana palmeri* and of gram [*Cicer arietinum*] is prohibited absolutely.